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VOLUME XLIII
No. 24

December 15, 1917

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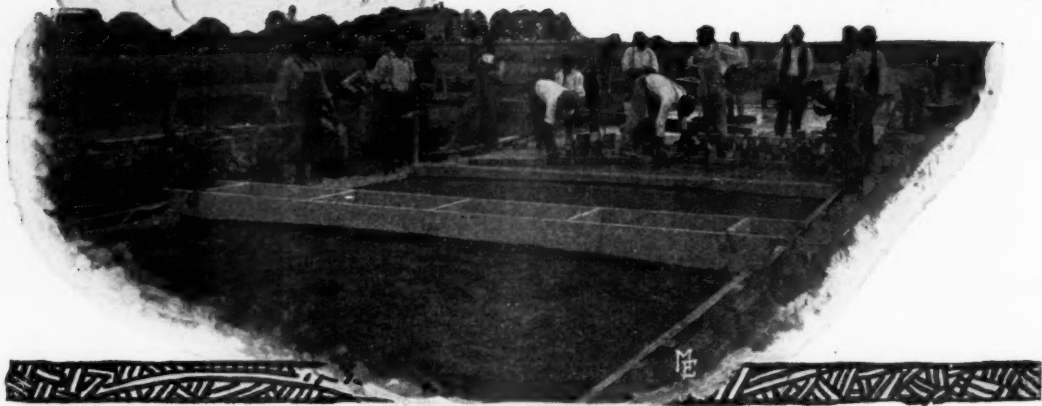
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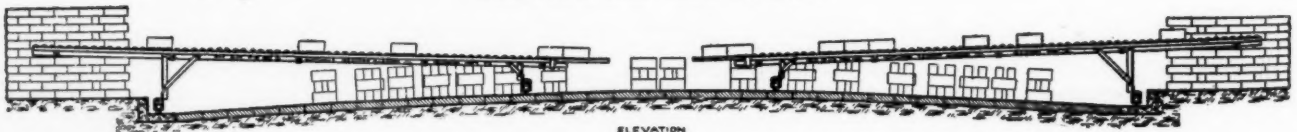
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Municipal Journal

Volume XLIII.

NEW YORK, DECEMBER 15, 1917

No. 24

CAMP MERRITT AS A CONSTRUCTION PROBLEM

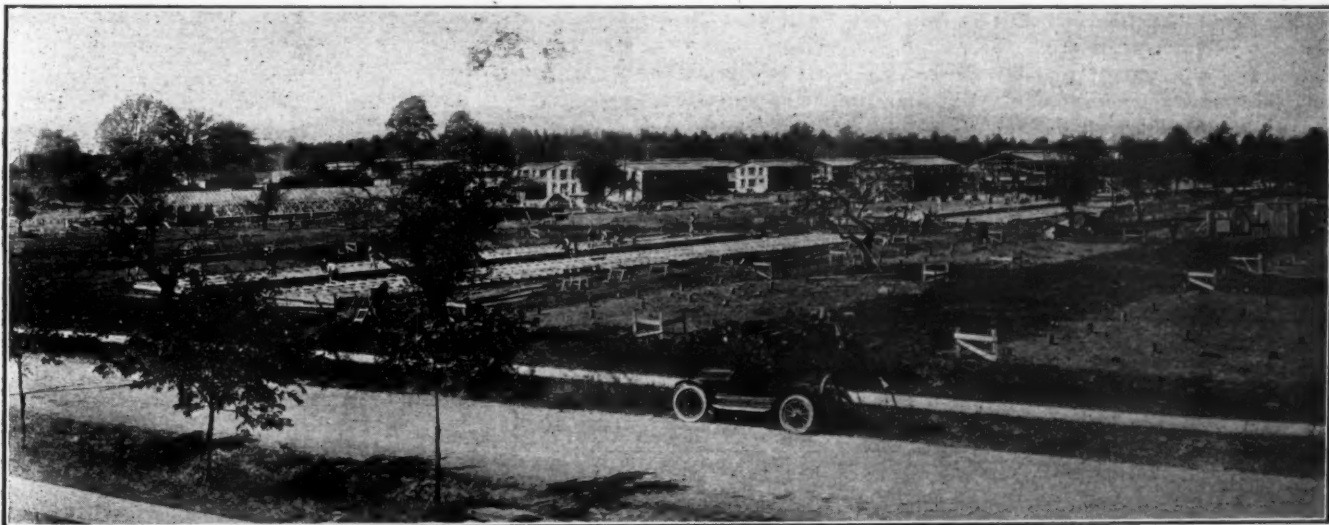
Building Water Supply, Sewerage, Refuse Disposal, Fire Protection, Street Lighting, Theatres, Restaurants, Hospital and Other Necessities, Besides Barracks and Officers' Quarters, for Thirty Thousand Men in Three Months.

There are now entirely or nearly completed, thirty-two camps in the United States erected for the purpose of housing soldiers on their way to France. These comprise sixteen cantonments, three national guard camps, twelve officers' training camps, and the embarkation camp for the port of New York. The last named was one of the latest to be begun and in several respects it represents systems and methods developed from the experience obtained in the construction of the other camps.

Much is to be found in the daily press concerning the social and military side of the camp work, and figures have been published for the purpose of giving the general public some idea of the unprecedented amount of the work done and the remarkable celerity with which it was carried on. The engineer and contractor, however, can appreciate many phases of the work which would have little meaning for the non-technical citizen, and it is the

the direction of the entire enterprise from the first blocking out of the plans to the final completion of the work. The latter is much the more important and interesting, the plans and structural details containing comparatively few features out of the ordinary; but in order that the latter phase of the work may be better appreciated, it is proposed to describe the physical features first.

The camp is designed to hold 30,000 men at one time, serving as a temporary resting place for troops after reaching this vicinity and before embarking upon the transports. The camp occupies an area of something over 700 acres at Tenaflly, N. J., about 6,000 feet from the West Shore R. R., and contains about 820 buildings, thirty-eight of which were already on the site. These buildings include barracks and officers' residences, a hospital, post office, fire station, laundry, bakery, post exchange, club rooms, theatre, building for the Y. M. C.



GENERAL VIEW OF NORTHWEST SECTION OF CAMP THREE WEEKS AFTER BEGINNING WORK.

aim of this article to present those features of the task involved and the method of carrying on the work, which will appeal most directly to this class. For this purpose Camp Merritt, the embarkation camp for the port of New York, will be used as typifying perhaps the most advanced method of procedure so far as engineering and administrative features go.

The description of the carrying out of this work may be given under two heads, one the description from a purely physical and engineering point of view, and the other, the administration of the work by the engineering force, the co-ordination of the various branches of work that are included in the completed camp, and in general

A. and one for the Knights of Columbus, telephone exchange, store houses, stables, garbage transfer station, coal trestle and bins, heating plant for the hospital, and other minor buildings. (The hospital will have capacity for 1,000 beds. The widow of Major General Merritt donated \$10,000 for the erection of the club house). The heating plant furnishes heat for the hospital only. The officers' residences are heated by steam heat from individual domestic plants, and the barracks are heated by stoves. Electric current for light and power is obtained from the Public Service Corporation of New Jersey, and the water supply from the Hackensack Water Company. A sewerage system was constructed entire, including both



TEMPORARY TRACK. BUILDING CONSTRUCTION UNDER WAY.

a collecting system and a treatment plant. There are about nine miles of streets, which are lighted by incandescent lamps mounted on wooden poles, the wires also being carried on wooden poles.

The camp site is upon a ridge which slopes slightly toward the south, more rapidly toward the east and still more rapidly toward the west. The difference between the highest and lowest points within the grounds is about sixty feet. The general soil consists of red clay underlaid at no great depth with red shale. Previous to the construction of the camp there were thirty-eight buildings on the grounds, which were purchased and retained for use; and six dedicated streets and roads in the area, totaling about 2,000 feet in length, were retained as a part of the street system of the camp.

The main streets of the camp are paved with water-bound macadam, and the company streets are surfaced by being graded and rolled, then covered with four inches of cinders and rolled again. As there will be continuously in the camp from 15,000 to 30,000 men, labor will always be available for carrying on any maintenance work, while the heating and power plant will furnish cinders, which can be used for maintaining these cinder roads, and the waterbound macadam also will undoubtedly be maintained in the best of condition by means of the abundant labor available. The streets constructed as a part of the work included about 28,600 feet of macadam and 17,920 feet of cinders.

The water is derived from the New Milford pumping station of the Hackensack Water Company, that company laying two twelve-inch cast iron mains for a distance of about 3,600 feet to the cantonment, these mains leading from an existing twenty-four-inch main of the company's system. (For description of this pumping station, see Municipal Journal for May 3, 1917.) Each twelve-inch main can be supplied from either direction,

thus providing against any interruption of supply by a break in the twenty-four-inch main. At the end of the twelve-inch mains are set two meters, one on each main, together with valves, all inclosed in appropriate chambers. From this point the construction was carried on by the government contractor.

All the water pipe in the cantonment is wire-wound wood-stave, except that the bends, branches and other specials are of cast iron, and the service pipes are of one-inch to 2½-inch galvanized wrought iron. The total amount of pipe, both mains and services, is 87,932, or about seventeen miles. Leading from the valve chamber is a twelve-inch main, which passes through the cantonment and from which eight-inch and six-inch laterals lead. Except for the main and two branches, all the water pipes are laid in the continuous open spaces between the buildings, and nearest to those in which running water is provided. The maximum length of water main laid in one day was 4,200 feet.



SPUR TRACK FROM WEST SHORE R. R. TO CAMP.

Fire protection is provided by 145 standard fire hydrants, with one steamer and two hose outlets, connected with the main by four-inch pipe. The pressure on the distribution system under normal conditions of domestic consumption is about fifty to seventy pounds. Two triple combination motor fire engines are contained in the fire station and a regular force of firemen will be maintained; in addition to which every building is pro-



CONTRACTOR'S CAMP—BEGINNING OF ACTUAL WORK, AUGUST 20TH.

vided with chemical hand extinguishers and Geyser fire bucket pumps. When construction first began, and without waiting for the completion of the permanent system, about 6,000 feet of cast iron pipe was laid on the surface of the ground to furnish fire protection, drawing its supply from mains of the Hackensack Water Company, which were already in service providing water to the residences on the site.

The sewerage system consists of 74,732 feet of six-inch to twenty-four inch vitrified pipe in the camp, including the services, and 13,740 feet of fifteen-inch to twenty-four-inch outfall. About one-third of this length was laid with cement joints, and the remainder with bituminous joints to provide against infiltration of ground water. The depth of the sewer varies from a minimum of two feet to a maximum of seventeen feet in the outfall line. Connections to the buildings are all made with six-inch pipe. Manholes are placed at all changes of grade and of line and at intersections. These manholes are con-



TRENCH DIGGER AT WORK ON SEWER TRENCH.

men, with a maximum or peak flow $3\frac{1}{2}$ or four times as great. The grades were calculated to give a minimum velocity of flow of two feet per second. In excavating the trenches, eight trench machines were employed, but rocks, boulders and tree roots interfered with their successful operation and a considerable part of the digging was done by hand. Probably half of the length of trenches within the cantonments had to be sheeted and braced, and two-thirds of the outfall line. Excavation was being carried on at twenty to twenty-five points at one time, the number of men employed on sewer work reaching a maximum of 900. The maximum length of sewer laid in one day was about 2,600 feet.

The outfall sewer conducts the sewage to the Hackensack river, about $2\frac{1}{2}$ miles away, where the sewage is treated by passing it through bar screens and a septic tank and treating the effluent with liquid chlorine. Eight sludge beds are provided for treating the sludge from the septic tanks, these consisting of broken stone covered with gravel and sand. As in the case of the water supply, temporary provision had to be made for sewage from the cantonment during construction, since a large number of men (reaching at one time 7,500) were at work, and most of them living within the area. For this purpose latrines were used and were burned out each night. The sewage treatment plant went into operation November 24th, the outlet into the river being completed on that day. The plant itself had been finished several days before, including putting it and the surroundings into a fine, trim condition not exceeded, probably, by any plant in the country.

The garbage is collected in covered cans, and the other refuse in separate cans, and all are carried in the original

ONE OF THE BUILDINGS ON THE CAMP SITE.
Used as office by Hill & Ferguson, the engineers.

structed of brick, and in the main streets are provided with standard cast iron heads and covers, but in the company streets are simply covered with wooden covers. The capacity of the sewers was calculated for a consumption of fifty gallons per capita per day for 30,000



WATER MAIN UNDER CONSTRUCTION. VIEW NORTHEAST FROM WATER TOWER.

cans to a transfer station, where the refuse is removed by contract with private parties, who pay the government for the material. Refuse cans are delivered on a long platform by the collecting wagons, which drive along one side thereof. The cans are then emptied into the contractors' trucks drawn up on the other side of the same platform, after which they are sterilized and placed at a point convenient for removal by the collecting wagons as they leave the station.

Current is brought from the transmission line of the Public Service Corporation to a transformer station, from which it is distributed through the cantonment by two distributing lines, one for power and the other for lighting. Lighting is provided in the entire 781 new buildings, a total of 860,000 feet, or about 163 miles of wire being used, 20,300 lamps and 600 poles.

Heat is provided for 771 of the new buildings, 90,000 square feet of radiation being provided for steam heating. The heating and plumbing required 160,000 feet, or nearly 21 miles of pipe. Among other quantities used on the work were 24,000,000 feet B. M. of lumber, 6,136 kegs of nails, 400,000 brick, 104,720 barrels of cement, 60,000 windows (about 15 acres of window glass), and 7,000 doors.

Among other structures may be mentioned $2\frac{1}{2}$ miles of permanent railroad and three miles of temporary railroad for bringing from the West Shore R. R. the materials used in construction and later those required by the operation of the cantonment. A freight yard is provided, connected with which are six storage warehouses.

The entire work of construction was done by the MacArthur Bros. Company, under the regulation form of contract followed in the cantonment construction and previously described in Municipal Journal, under which the contractor receives the actual cost plus a percentage, which decreases as the cost of the work increases.

In the article dealing with the administrative work (to appear next week) will be described the methods employed by Hill & Ferguson, the engineers in charge of all the work, for completing this work in about three months.

SEWAGE DISPOSAL FOR A NEW YORK AREA

Population of Two and a Half Million on Flat Land Draining to Shallow Bay—Oyster Pollution—Dilution.

Although the city of Greater New York is under one political administration, it contains a considerable number of distinct topographical areas, which condition necessarily divides its sewerage problem into various more or less individual and distinct local problems. Possibly the most difficult of these is that connected with the southern part of the boroughs of Queens and Brooklyn, lying south and southeast of the village of Jamaica and containing about 45,000 acres. This territory is all tributary to Jamaica bay and through it to the Atlantic ocean, and drainage from this area could be diverted from this body of water only by a prohibitive expenditure for pumping. This district is divided into two distinct areas by Jamaica bay. At present it contains a population of about 500,000, but it is being built up rapidly and it is estimated that by 1960 the population will have increased to 2,500,000. This is a population greater than that of Berlin and most other large European cities, and is in fact exceeded at the present time only by London, Paris, Chicago, and New York itself.

The problem of sewerage this district has been considered by a number of officials and commissions during the past few years and several solutions have been proposed. In 1916, the president of the borough of Queens requested the board of estimate and apportionment to pass upon a tentative plan for sewerage this district. The engineer of sewage disposal of the board, Kenneth Allen, recently submitted to the board a report upon this tentative plan and also upon other plans proposed, making recommendations for the adoption of certain definite methods of solving the several problems presented. In this report, Mr. Allen has explained a number of the principles employed in developing the plan, which principles are of more or less general application and will be of interest to sewerage engineers generally. We are presenting, therefore, an abstract of that part of his report that deals with these principles and applications of them, which we think will be of interest and service to such engineers.

The magnitude of the problem has already been referred to. It is estimated that within the next 40 years the domestic sewage from this area will approximate 300,000,000 gallons a day. The expense for the construction is estimated to be about \$21,500,000, and about \$572,000 as the annual cost of operation and maintenance. These estimates do not include the cost of acquiring property for sewer lines, sewage treatment plants, etc.

DISPOSING OF THE SEWAGE.

Jamaica bay, which must receive this 300,000,000 gallons per day, covers about 21.5 square miles at high tide and $17\frac{1}{4}$ square miles at low tide. The tidal range averages about 4.3 feet. The tidal prism, or the volume passing through the inlet to the ocean with each flood and ebb tide, amounts to 2,308,710,000 cubic feet, and this tidal movement must be relied upon for the dilution of the sewage. The volume of water remaining in the bay at mean low tide is slightly less than the tidal prism; or in other words, the bay contains twice as much water at times of high water as at times of low water. During the latter period, the average depth is 4.7 feet, but through it pass several channels, which at points reach extreme depths of 32 to 66 feet. The amount of upland or surface water that flows through the bay to the ocean is very uncertain, but has been computed at 24,000,000 cubic feet for each cycle of the tide.

The current velocities in the bay are generally low and influenced by the wind; float experiments indicating a maximum channel velocity of 2.1 feet per second during the flood and 3.4 feet during the ebb. These velocities are sufficient to prevent deposits in the channels, but in the interior of the bay the velocities are too low to prevent the formation of deposits from domestic sewage or storm water.

An additional complication is presented by the probability that this bay will be developed for commercial purposes by dredging a channel around its margin, constructing bulkheads, etc. This will considerably increase the volume of water in the bay and therefore proportionately decrease the percentage of such water that will be replenished by tidal ebb and flow. Such development will also diminish the velocity of flow and thus increase the tendency for deposits to form, while the commercial use of the shores will render more essential the avoidance of deposits and other nuisances in the adjacent waters than is the case at present, with the lands above water around and in the bay largely marsh.

At the present time, nearly 1,000,000 bushels of oysters are planted annually in the bay, representing a business amounting to about \$1,000,000 a year, while the raising of clams therein represents an income of about \$8,000,000 or \$10,000,000 a year. It is probable that this use of the

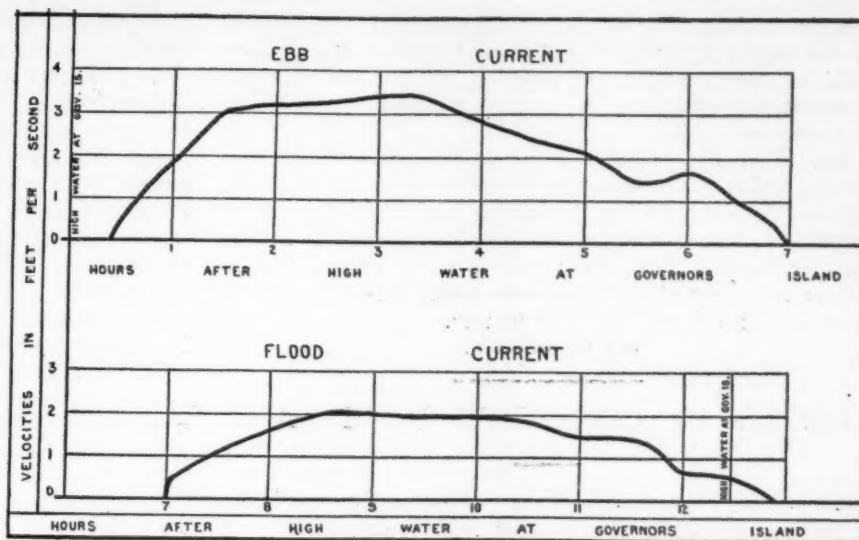
bay will be prevented by the federal and state health authorities. Aside from the question of shellfish contamination, however, the discharge of sewage into the bay would be objectionable on account of the formation of deposits at the bottom, the creation of putrefactive conditions in the water and of unsightly appearance of the water, due to turbidity, scum, or sleek, the effect on fish life, and the possible danger of infection to bathers.

To prevent the continuation and increase of the pollution and formation of deposits which has already been found to be occurring, the solids brought down in the sewage should be removed as completely as practicable. As this can be accomplished most effectively by the use of grit chambers and tanks or fine screens, the entire sewage of this area should in the future be treated by one or more of these devices, and the plans presented by Mr. Allen are outlined on this assumption.

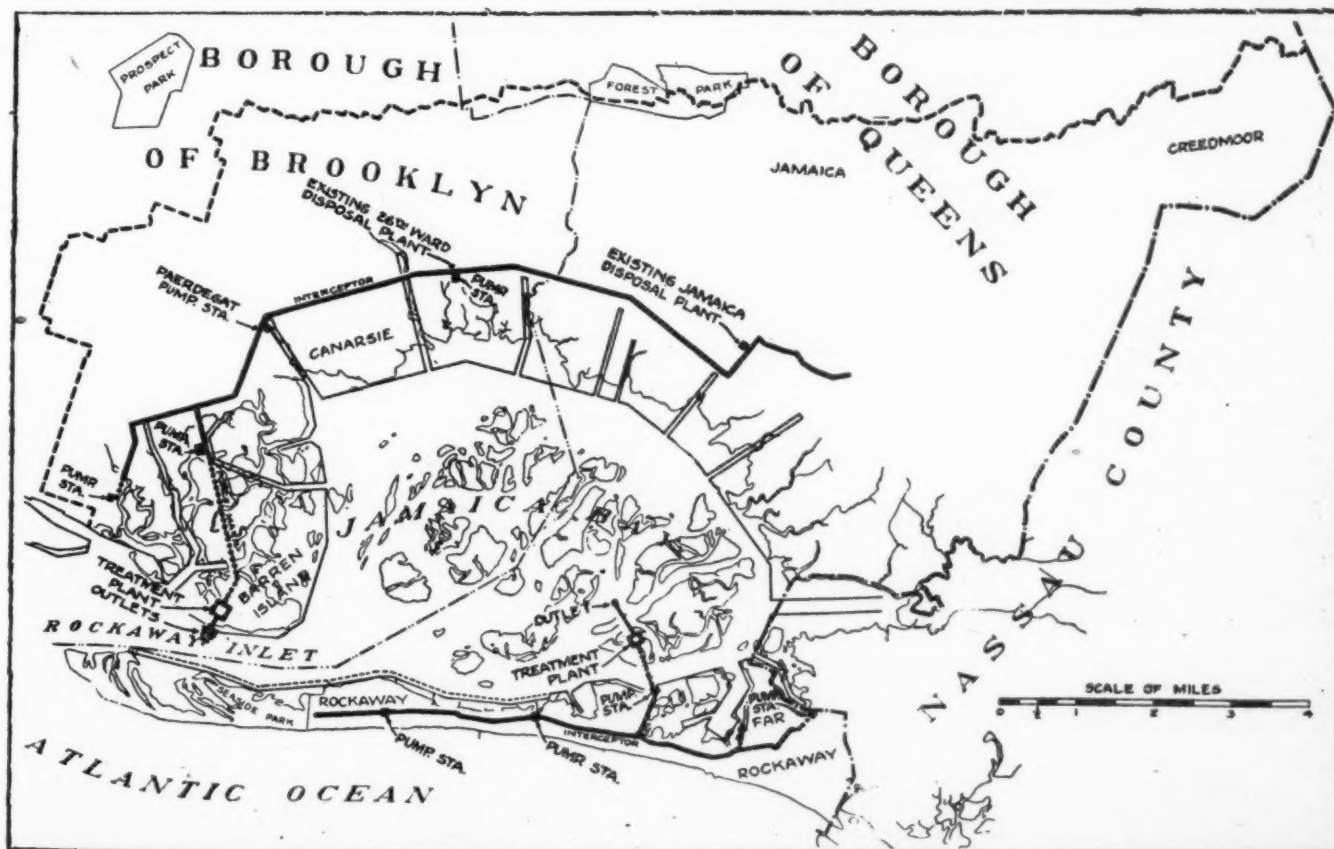
Concerning the dangers that oysters and clams raised in sewage-polluted water may cause typhoid and other diseases, Mr. Allen cites the facts that in 1904, 21 cases of typhoid were traced by Dr. George A. Soper, to oysters floated near the head of Jamaica bay; the report of the United States Department of Agriculture that investigations made by it in 1911 showed that not only 27 cases of typhoid fever but 99 cases of gastroenteritis were caused by dangerously polluted oysters contained in this bay; and the results of the examination by the bureau of chemistry of the Department of Agriculture of oysters from Jamaica bay for presence therein of colon bacilli,

such bacilli having been found in one-tenth dilutions of the shell liquor.

While the amount of dissolved oxygen at the inlet is at present satisfactory in amount, that along the shore becomes as low as 19 or 20 at certain points and certainly cannot be appreciably diminished without danger of objectionable conditions arising. To prevent the formation of odors that would result from the putrefactive conditions following a material depletion of the dissolved oxygen, sewage discharged into the bay more than two or three miles from the inlet should, besides having suspended matter removed therefrom, be subjected to some oxidizing treatment, such as filtration or direct aeration, that will render the effluent reasonably stable. No



CURRENTS IN CHANNEL AT ROCKAWAY INLET.



MAP OF JAMAICA BAY AND AREA DRAINING TO IT.

Light lines in the bay show proposed lines of commercial development. Heavy solid lines represent suggested main sewers. Heavy dotted line is boundary of drainage area.

specific method of oxidizing the sewage is recommended in this report because of the probability that experiments with activated sludge, or possibly others, will develop methods for effecting this, which will be preferable to any now available.

Mr. Allen believes that if the greater part of the suspended solids are removed from the sewage and the liquid portion entering the interior of the bay is oxidized so as to produce a reasonably stable effluent, the waters will be unobjectionable from any point of view, except that of oyster culture and bathing, which latter should in any case be discontinued in these waters.

(To be continued.)

CRACKS IN CONCRETE PAVEMENTS

Conclusions from Seven-Year Investigation by U. S. Office of Public Roads—Setting Contraction—Wetting and Drying—Waterproofing.

Specialists of the Office of Public Roads of the U. S. Department of Agriculture have recently concluded a seven-year study of cracking in concrete pavements, which has included measuring the amount of expansion and contraction caused by alternate wetting and drying and by temperature changes in concretes of various proportions of ingredients. The results are given in a report just issued by the department.

The report makes no attempt to apply the results to the practical side of road construction, although certain general conclusions drawn, it is said, may be capable of utilization by engineers. These conclusions are:

1. Neat cement, when allowed to dry, first contracts rapidly, then more slowly. The amount of contraction seems to vary with the cement, size of specimen, and condition of atmosphere in which drying takes place. The amount at 28 days is about 0.1 per cent and at 6 months about 0.2 per cent.

2. Mortar contracts on hardening in air and expands on hardening in water. The contraction in warm, dry air at 28 days is about 0.045 per cent for 1:2 and 1:3 mortar and at 6 months is 0.078 for 1:3 mortar and 0.085 for 1:2 mortar. The expansion in water is 0.01 per cent for 1:3 and 0.017 for 1:2 mortar at 28 days, and at 6 months 0.013 for 1:3 and 0.02 per cent for 1:2 mortar.

3. Both 1:2:4 and 1:3:6 concrete contract on drying in warm, dry air from 0.02 to 0.04 per cent at 28 days and from 0.04 to 0.07 per cent at 6 months. When hardening in water an expansion of about 0.01 per cent takes place at 28 days and 6 months in 1:2:4 and 1:3:6 concrete.

4. The richness of the mix of concrete seems to exert a small influence on the contraction; the richer the mix the greater the change in length.

5. Concrete alternately wetted and dried may be made to expand and contract owing to these causes. The expansion due to wetting is more rapid than the contraction on drying. The thoroughly dried specimens of concrete do not recover their original wet length when immersed.

6. Concrete stored in the outer air and exposed to the weather does not contract to the same extent as the above described specimens except under very dry conditions.

7. A waterproof covering, such as coal tar, prevents the rapid change in moisture content and greatly retards the expansion and contraction.

8. Reinforcement decreases, but does not prevent the shrinkage and expansion of concrete due to drying and has no effect on temperature changes. Reinforcement

can not, therefore, entirely prevent cracks, but seems to distribute them and keep them small.

9. Concrete roads are affected by both temperature and moisture. When the drainage is good and the sub-base not wet the temperature effects seem to be most important. A wet sub-base may add to the temperature expansion by about 0.01 to 0.02 per cent. The restraining effect of friction at the base seems to be almost negligible when figuring temperature and moisture expansion and contraction. In very dry climates shrinkage due to drying must be added to contraction due to fall in temperature. A shrinkage of 0.04 per cent (one-quarter inch in 50 feet) is a safe allowance due to drying.

10. Temperature at time of construction of road should be considered in designing joints. Cold-weather construction requires a full allowance for temperature expansion and, on wet sub-bases, for moisture expansion also. Hot-weather construction theoretically requires no joints at all, even in wet sub-bases, as the temperature contraction exceeds the moisture expansion. However, the difficulty of keeping the cracks clear probably renders joints imperative.

The report is published as Bulletin 532 of the Department of Agriculture, which will send it free on application.

CITIES RESISTING RATE INCREASES.

A conference of mayors, city attorneys and corporation counsels of a number of New York state cities met at Albany on November 27th to consider the matter of the applications made to the state Public Service Commission by gas and electric companies for permission to change rates in the cities represented.

City attorney R. C. S. Drummond of Auburn outlined the efforts that the public utility companies are making to increase rates and make a consumers' service, or ready-to-serve charge. This charge, he claimed, would be a hardship on the small user of gas or electric light. There was a general discussion of the subject, after which the following resolutions were adopted:

Resolved, That the cities represented at this conference oppose the proposed consumers' or service charge.

Resolved, That the president of the New York State Conference of Mayors and Other City Officials be requested to appoint a special committee to assist all cities in opposing any application for increase in electric light, power and gas rates, or any increase in the cost of service of any of such utility companies.

Resolved, That this committee also investigate the subject of municipal ownership and operation of gas, electric light and power plants and make recommendations to the cities.

Resolved, That this committee be instructed to prepare and have introduced at the next session of the legislature amendments to the Public Service Commissions Law providing:

(1) That no rate charges by a public service corporation shall be increased until a determination by the Public Service Commission upon the merits.

(2) That no change in rates be granted to a public service corporation until it has satisfied the Public Service Commission that it has afforded the municipality affected a full and fair opportunity to examine its books, records and property.

(3) That in every case of an application for an increase of rates, the burden of proof throughout the proceedings be placed upon the public service corporation.

(4) Any other amendments necessary to give to the people the same protection now granted to the public service corporations under the law.

Mayor Burns appointed the following as members of the committee provided for: Corporation counsel Stewart Hancock, Syracuse, chairman; corporation counsel R. C. S. Drummond, Auburn; corporation counsel Boyd McDowell, Elmira; corporation counsel Owen C. Becker, Oneonta; corporation counsel H. L. Hooker, Watertown; corporation counsel E. W. Davidson, New Rochelle.

Municipal Journal

Published weekly at
243 West 39th Street

by
Municipal Journal and Engineer, Inc.

S. W. HUME, President
J. T. MORRIS, Treas. and Mgr. A. PRESCOTT FOLWELL, Sec'y.

A. PRESCOTT FOLWELL, Editor
W. A. HARDEMBERGH and SIMON BARR, Assistant Editors
CHARLES CARROLL BROWN, Western Editorial Representative

Telephone, 9391 Bryant, New York
Western Office, Monadnock Block, Chicago

Subscription Rates.

United States and possessions, Mexico and Cuba.....\$3.00 per year
All other countries..... 4.00 per year
Entered as second-class matter, January 3, 1906, at the Post Office at New York, N. Y., under the Act of Congress of March 3, 1879.

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SERVICE CHARGES FOR PUBLIC UTILITIES.

As stated on another page, officials of a number of cities of New York state a few days ago, in taking action to oppose the increasing of rates for gas and electric light and power contemplated by public service companies in their cities, passed a resolution opposing a service charge by such companies. Whether or not the rates should be increased (and this would seem to be a matter to be decided individually for each city in accordance with franchise conditions and company finances), we believe that the officials are wrong in opposing the use of the service charge as a principle of rate making. It has been quite generally accepted as a correct principle in making water works rates, and we can see no reason why the same arguments do not hold good for the sale of gas and current.

It has been argued that the poor man using a small amount of water, gas or current should not be charged a higher price per unit used than is the (presumably) wealthier user of larger quantities; one reason given being that the manufacturing cost to the company or city per unit of material or current is the same in both cases. On the other hand, large consumers demand special rates and companies find it to their advantage to grant them. There is a logical reason for giving the large consumer more favorable terms, and this reason finds expression in the service charge. If we take the lowest rate as a basis, we may assume that the same rate is used for all classes, and that the difference between the average annual bill for any class, and what that bill would amount to if based solely upon such minimum rate, is the cost

to the company of services necessarily performed other than the manufacturing of the water, gas or current.

Such services consist of furnishing and maintaining a meter, reading the same, keeping the consumer's account, making out bills and collecting, furnishing the mains and connecting the same to his premises, etc. Most of these cost almost as much for a small account as for a large, and the part of the charge for service rendered that is based upon these would therefore be entirely independent of the amount of water, gas or current used.

This would, of course, make the charge to the small consumer greater *per unit used* than to the large consumer. But to make the charge per unit used the same to each is to make the large consumer pay more than his share of the service costs. If a city wishes to do this to favor the poorer citizens, well and good. But we do not see how they can present any arguments for requiring a public service company to make such discrimination against its large consumers.

The service charge represents a real expenditure in rendering public service that must be paid by the consumers. The question is whether it shall be paid almost entirely by the large consumers, or shall be distributed among all in proportion to the service received by each.

CONCEALED JOINTS IN CONCRETE PAVEMENTS.

One of the arguments used against the concrete pavement is the apparent necessity for joints at intervals of 30 to 60 feet across the pavement and the slight jolting of traffic and objectionable appearance caused by such joints. Macon, Ga., has for several years been using what is known as the "concealed joint," and this method of construction was adopted last year by Fulton County, Ga. In this construction the joints are of the contraction type—that is, consecutive sections of concrete are separated by a thin strip of tar paper or other material which will prevent any bonding between the two sections, but no space is provided to allow for expansion; but the material used for effecting the separation of the sections is not brought to the surface but is stopped within about one-half inch of the same and the entire surface is made continuous. As the pavement dries out, a fine crack will ordinarily develop in the surface directly over the joint. In Georgia, at least, these cracks do not appear to open to any appreciable extent at any season of the year.

The advantage of this joint is that the entire surface is continuous and there is no jolting experienced by traffic in passing over the joints; also the fine cracks are hardly visible, as compared with the greater or less evidence of the bituminous joint, which shows a black streak where the expansion joints are brought to the surface. It is not only that the one-half inch or inch of width of the joint itself produces an unevenness of the pavement, but, owing to the fact that each section between joints is finished as a separate unit, there is apt to be a slight non-uniformity of general surface between adjacent sections where the surface joint is employed. Whether the advantage of this joint would be experienced as completely in a northern climate, where the temperature falls lower and contraction therefore is probably greater, is a question which should be carefully considered in connection with the advisability of adopting this construction in the northern states.

In Fulton county work, on one of the roads at least, if not on all, the contraction joints are placed at 35-ft. intervals. The construction of joints adds somewhat to the cost of a pavement, in that it makes a break in the continuousness of the work, requires a certain amount of

labor in setting the joint form, etc.; as a result of which, it may be said that the fewer the joints the less the construction costs. The amount involved, however, is comparatively small, and we have for some time considered the advisability of the use of a much greater number of joints than is common practice; for instance, joints every 10 feet transversely of the pavement. Our chief reason for suggesting this is that the entire amount of contraction and expansion in a given section of pavement between joints is concentrated at the joints (unless these are so far apart that motion cannot be carried throughout the entire length of the section, in which case cracks will appear intermediate between joints). That is, if joints are 50 feet apart, they will open approximately twice as wide when the concrete contracts as is the case with joints 25 feet apart. If this reasoning is correct, a pavement with joints 10 feet apart would show only one-fifth as much opening at each joint as where these are placed 50 feet apart. If the concealed joint construction be employed, we would probably have at each joint such a narrow opening formed by any ordinary contraction, due to either cold or drying out of the concrete or both, that it would be neither noticeable to the sight nor sufficient to induce a breaking down of the edges of the joint or crack. Experiments made indicate that if a pavement is kept damp for at least two weeks after being laid, the contraction due to drying does not exceed .02 per cent to .04 per cent, which amounts to about one-twentieth to one-fortieth of an inch in 10 feet. Theoretically the contraction due to a fall of temperature from 70° as the mean temperature during setting to 10° as a minimum daily average, would produce approximately the same amount of contraction, if not off-set by expansion due to absorption of moisture. We therefore have, as a maximum width of joint that can be expected with 10-foot intervals, one-twentieth to one-tenth of an inch, whereas with 50-ft. joints one-fourth to one-half inch would theoretically be possible. As a matter of fact, due to various causes, the actual contraction experienced in pavement is probably only about one-half of the theoretical amount, and we might accordingly expect that the cracks formed in the surface over joints formed at 10-ft. intervals would be from one-twentieth to one-fortieth of an inch and those at 35-ft. intervals in northern climates from about 1/6 to 1/12 of an inch. In a southern state, where the average temperature throughout a 24-hour period seldom falls below 35° or 40°, thus giving only about half the range indicated above, the width of opening would, of course, be less.

Both the theoretical considerations and experience seem to indicate that there is no alternative between a multiplicity of small cracks or joints and the concentration of the contraction into a smaller number of wider openings. Such concentration is limited by the strength of the concrete employed, and 50 or 60 feet seems to be the maximum distance over which it can be effected. At the other extreme, it has been found that, by the use of reinforcement, the expansion can be distributed over a very great number of cracks more or less uniformly distributed throughout the pavement, but no amount or kind of reinforcement will entirely prevent the formation of these minute cracks, although they may be invisible and produce no serious openings in the pavement. This effect of reinforcement was observed by investigators of the Office of Public Roads, an abstract of whose report on their experiments is given this week in another column. It would seem logically also to be unavoidable when we consider that the reinforcement itself contracts and expands with temperature changes in nearly the same ratio as does concrete. It might be expected, however, that it would diminish the expansion effect due to

absorption of moisture, and to this extent diminish the total amount of movement of the entire pavement as well as distributing such movement in a multiplicity of cracks.

CHANGE OF PUBLICATION DATE.

Subscribers will notice that the date of this issue is December 15th, instead of 13th—Saturday, instead of Thursday. This was not a mistake, but a change in the day of publication has been made and in the future Saturday will be the publication date of Municipal Journal. We will endeavor to secure the delivery of papers only one day later than heretofore, however.

MOTOR FIRE APPARATUS IN AMERICAN CITIES

Summary of Data Given in Tables Previously Published—Chemical and Hose with Ladders the Most Popular Kind of Apparatus.

A list of the motor apparatus in service in American cities was given in tabulated form in Municipal Journal for Nov. 29th and Dec. 6th. We have totaled the figures in these tables to determine the total number of pieces of each kind of apparatus reported by these cities. This is not all of the motor apparatus in use in the country, but the cities listed include practically all of the larger ones and probably a very high percentage of the smaller ones that possess motor apparatus, and we believe that the figures given include fully 75 per cent of the apparatus in service in the country.

The total number of pieces of apparatus in service tabulated is 4,217. The chemical and hose with ladders appears to be the most popular, both as to number of cities owning same and as to total number in service, 339 cities owning 688 of such wagons. The piece of apparatus owned by the next largest number of cities is the hook and ladder truck, 269 cities owning 573 of these. However, a larger number of chief's cars is in service, although owned by a somewhat smaller number of cities, 245 cities owning 608 of such cars. The next in order of number in service is the hose wagon, of which 510 are used by 187 cities. Following these in the order named are: Chemical and hose without ladders—347 used by 136 cities; gasoline pumping engine with hose—316 owned by 124 cities; tractors—259 owned by 68 cities; triple combinations—253 owned by 169 cities; gasoline-driven steam pumpers—229 owned by 44 cities; fuel or service wagons—133 owned by 51 cities; chemical engines—86 owned by 58 cities; gasoline pumping engine with chemical—59 owned by 33 cities; squad wagons—44 owned by 30 cities; repair wagons—43 owned by 35 cities; gasoline pumping engine without hose or chemical—41 owned by 19 cities; and 28 water towers owned by 20 cities.

These are the pieces of apparatus in actual service. In addition, there are in reserve the following pieces of motor apparatus: 31 chief's cars in reserve in 20 cities; 42 hose wagons in 16 cities; 18 hook and ladder trucks in 12 cities; 14 chemical and hose with ladders in 10 cities; 9 chemical and hose with ladders in 7 cities; 6 chemical engines in 4 cities; 6 gasoline-driven steam pumpers in 4 cities; 2 triple combinations in 2 cities; 2 gasoline pumping engines with hose in 2 cities; 2 tractors in 1 city; 1 squad wagon, and 1 water tower. This is about 3 per cent of the total number in use.

The steam pumper owned by Hartford, Conn., is steam-propelled as well, but all the others in this class are gasoline-driven. In some cities the motor chemicals are used as tractors for pulling old horse-drawn or hand-drawn hose wagons, and motor pumping engines are so used for drawing hose wagons or chemicals, etc. This

is indicated in several instances in the table by the foot notes, but there are possibly other cases where this use was not reported. In Pittsburgh, where 29 tractors are used, 7 are attached to hook and ladder trucks and 22 to steam fire engines.

The data given in this year's tables do not include any horse-drawn or hand-drawn apparatus. There is still considerable of this in use, but very little new apparatus of this kind is being purchased, except hand apparatus for factories, institutions and other private fire protection. The list of horse-drawn and hand-drawn apparatus published by us last year will probably serve fairly well for this year also, most of the change therein being due to providing tractors for towing horse-drawn apparatus, or the retiring of such apparatus from active service to make way for motor apparatus.

Five years ago there was very little motor apparatus in reserve, reserved apparatus being confined almost exclusively to horse-drawn apparatus supplanted by new motor apparatus of the same class. We now find, however, that the motor apparatus is beginning to be represented in the reserve list, probably due in many cases to the later installation of more recent and effective developments in such apparatus.

Totals of Pieces of Each Kind of Apparatus in Service and Reserve.

	No. of pieces in service	No. of cities	No. of pieces in reserve	No. of cities
Chief's cars	608	245	31	20
Chemical & hose, with ladders....	688	339	14	10
Chemical & hose, without ladders..	347	136	9	7
Hook & ladder trucks.....	573	269	18	12
Triple combinations	253	169	2	2
Hose wagons	510	187	42	16
Tractors	259	68	2	1
Chemical engines	86	58	6	4
Gasoline pumps, with hose.....	316	124	2	2
Gasoline pumps, without hose or or chemical	41	19		
Gasoline pumps, with chemical..	59	33		
Gasoline-driven steam pumper....	229	44	6	4
Fuel or service wagons.....	133	51		
Repair wagons	43	35		
Squad wagons	44	30	1	1
Water towers	28	20	1	1
Totals	4,217		134	

MILEAGE BY MOTOR FIRE APPARATUS

**Average Number of Miles Run in a Year by Each
Kind of Apparatus in Each of Several
Hundred Cities.**

One of the advantages of motor apparatus for fire service is the distance they can cover in a given time and in continuous operation. It is interesting, therefore, to know how many miles are covered in a year by each kind of apparatus in the different cities of the country. This information was included with that furnished to us last month by the fire chiefs of several hundred cities, and has been tabulated, the first half of the table being presented herewith. The second half will appear next week.

The distance covered will depend, of course, on the number of fires and size of the city, and can not be expected to be so great in small as in large cities. The population of the cities listed in this table were given in the table in the November 8th issue, and the number of pieces of each kind of apparatus in each city in those of November 29th and December 6th.

As might be expected, the chiefs car in every case, we believe, covered more mileage than any other apparatus, between 1,000 and 5,000 miles in the majority of cases, or an average of about 3 to 15 miles a day. A synopsis of the mileage figures will be given next week.

AVERAGE MILEAGE PER YEAR MADE BY MOTOR FIRE APPARATUS.

City and State.	Chiefs Cars.	Chemical & Hose With Ladders.	Chemical & Hose Without Ladders.	H. & L. Trucks.	Triple Combina- tions.	Hose Wagons.	Tractors.	Chemical Engines.	Gasoline Pumping Engine & Hose.	Gasoline Pumping Without Hose & Chem.	Gasoline Pumper With Chem.	Gasoline Driven Steam Pumper.	Fuel or Service Wagons.	Repair Wagons.	Squad Wagons.	Water Towers.
Alabama:																
Brewton .....	...	...	...	...	...	100	...	...	...	...	...	...	...	...	...	...
Gadsden .....	...	1,000	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Selma .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Arizona:	3,000	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nogales .....	...	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Phoenix	1,200	320	...	120	...	...	...	...	...	...	...	...	...	...	...	...
Arkansas:																
Ft. Smith	3,000	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
California:																
Alameda	2,000	...	75	120	...	...	...	...	...	...	...	...	...	...	...	...
Berkeley	10,000	250	200	525	...	250	100	625	...	265	...	200	...	...	...	...
Coalinga .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Emeryville .....	...	200	...	...	...	...	...	25	...	...	...	...	...	...	...	...
Hayward	5,000	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Long Beach	2,500	...	...	160	...	205	...	820	...	...	...	...	...	...	...	...
Modesto	1,000	600	...	...	...	...	...	...	245	...	...	205	...	750	...	25
Monrovia .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Oakland	6,000	400	...	...	350	...	...	...	...	...	...	...	...	...	...	...
Palo Alto .....	...	...	...	350	400	...	400	500	400	400	400	...	...	...	...	...
Pasadena .....	...	...	...	...	...	...	...	500	...	...	...	...	...	...	...	...
Pomona	1,000	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Redlands .....	...	100	...	150	...	...	...	190	...	...	...	...	...	...	...	...
Richmond	3,000	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
San Leandro .....	...	800	...	...	...	...	...	...	100	...	...	...	...	...	...	...
Santa Monica	4,000	...	...	...	...	...	...	...	...	...	...	...	...	1,000	...	...
Santa Rosa .....	...	350	...	...	200	...	...	...	...	...	...	...	...	...	...	...
Watsonville	500	200	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Whittier .....	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	175	...	...	...	...	...	...	...

AVERAGE MILEAGE PER YEAR MADE BY MOTOR APPARATUS (Continued).

City and State.	Chief's Cars.	Chemical & Hose Ladders.	Chemical & Hose Without Ladders.	H. & L. Trucks.	Triple Combinations.	Hose Wagons.	Tractors.	Chemical Engines.	Gasoline Pumping & Hose.	Gasoline Pumping Without Chem.	Gasoline Pumper With Chem.	Gasoline Steam Pumper.	Fuel or Service Wagons.	Repair Wagons.	Squad Wagons.	Water Towers.
Colorado:																
Boulder	...	450	...	...	...	...	...	600	...	...	...	...	...	...	...	...
Ft. Collins	...	35	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Grand Junction	...	250	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Longmont	...	100	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Trinidad	10,000	4,000	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Salida	...	45	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Connecticut:																
Danbury	4,000	1,500	1,000	1,500	1,500	1,000	...	360	...	...	...	...	...	...	100	...
Greenwich	...	216	...	180	...	180	...	...	100	...	...	...	...	...	...	...
South Manchester	1,500	...	...	...	...	...	...	...	100	...	...	...	...	...	...	...
Torrington	...	160	...	...	...	...	...	...	100	...	...	...	...	...	...	...
Waterbury	5,000	500	...	400	300	400	...	700	400	...	...	...	300	...	...	...
District of Columbia:																
Washington	25,584	...	...	400	...	960	...	...	800	...	...	576	...	...	...	...
Florida:																
Daytona	258	60	...	...	225	...	...	...	...	...	...	...	...	...	...	...
Sarasota	...	...	...	...	100	...	...	...	...	...	...	...	...	...	...	...
Georgia:																
Americus	...	200	...	150	200	150	...	...	...	...	200	...	...	...	...	...
Athens	750	325	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Brunswick	2,500	1,100	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Carrollton	...	350	...	...	...	350	...	...	...	...	...	...	...	...	...	...
Moultrie	...	...	...	...	...	...	...	...	...	175	...	...	...	...	...	...
Newman	300	...	...	...	200	...	...	...	...	...	...	...	...	...	...	...
Rome	1,500	350	...	200	500	300	200	...	500	...	...	...	...	...	...	...
Valdosta	...	245	...	245	...	...	...	...	...	...	...	...	...	...	...	...
Idaho:																
Boise	1,600	400	...	...	...	...	...	1,000	350	...	...	...	...	...	...	...
Pocatello	1,000	300	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Illinois:																
Aurora	400	150	...	...	...	...	150	...	...	...	...	...	...	...	...	...
Belvidere	...	200	...	...	...	...	...	...	400	...	...	...	...	...	...	...
Calro	1,200	800	...	...	400	...	...	...	...	...	400	...	...	...	...	...
Champaign	5,000	200	...	100	...	...	...	...	150	...	...	...	...	...	...	...
Chicago Heights	3,000	250	...	...	...	...	...	...	...	...	...	...	...	...	...	...
East Moline	...	...	400	...	...	...	...	...	...	...	...	...	...	...	...	...
Elgin	3,000	125	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Evanson	2,500	...	...	700	450	...	...	...	...	...	...	...	...	...	...	...
Joliet	6,000	500	...	...	500	100	100	50	500	...	...	...	100	...	...	...
Macomb	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Murphysboro	7,000	...	...	200	200	200	...	...	...	...	...	...	...	...	...	...
Paxton	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Pekin	...	...	...	200	...	...	...	...	...	...	...	...	...	...	...	...
Witt	...	500	...	450	...	...	...	...	...	...	...	...	...	...	...	...
Indiana:																
Anderson	336	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Elkhart	1,500	325	...	...	...	75	...	...	320	...	...	...	...	...	...	...
Frankfort	2,000	1,000	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Gary	150	100	100	150	...	150	...	...	...	...	...	...	...	...	...	...
Kendallville	...	...	...	65	65	50	...	...	...	65	...	...	...	...	...	...
Kokomo	450	200	...	100	...	...	...	...	100	...	...	...	...	...	...	...
La Fayette	5,000	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Richmond	2,225	215	...	150	...	...	...	...	...	...	...	...	...	...	...	...
Terre Haute	4,000	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Vincennes	500	250	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Warsaw	...	225	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Warsaw	...	30	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Washington	...	40	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Iowa:																
Cedar Rapids	1,000	200	...	383	207	...	...	...	207	...	...	...	...	...	...	...
Council Bluffs	3,000	600	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Davenport	800	150	...	150	...	150	...	...	150	...	...	...	...	...	...	...
Denison	...	500	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fairfield	...	350	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Keokuk	...	...	...	...	200	...	...	...	...	...	...	...	...	...	...	...
Mason Ctiy	1,000	180	...	80	80	...	...	...	...	...	...	...	...	...	...	...
Muscataine	...	200	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kansas:																
Cherryvale	...	...	...	...	...	1,500	...	...	...	...	...	...	...	...	...	...
Fredonia	200	500	...	...	...	500	...	...	...	...	...	...	...	...	...	...
Independence	...	...	...	...	60	...	...	...	...	...	...	...	...	...	...	...
Kansas City	2,500	446	...	769	...	300	...	...	620	...	...	...	...	...	...	...

[illegible]

(To be concluded)

The WEEK'S NEWS

Bridge Construction in Montana—Financing Roads in Pennsylvania—Health Work Coordinated in Cleveland—Cincinnati's New Street Lights—Cleveland's City Heat Plant Wants Higher Rates—Philadelphia's Police and Politics—The Halifax Catastrophe—New Jersey's Civil Service—Chicago Has Money Difficulties—Subways for Cleveland Economical Plan—Auto Headlight Regulation in Minneapolis—Grade Crossing Death Statistics.

ROADS AND PAVEMENTS

Montana to Improve Bridge Construction.

Helena, Mont.—Following a meeting here of the state highway commission, which approved of the work already done by the executive committee and its plans for the future, announcement was made that the officers of the commission believe the most important work that can be done next year will be to secure greater efficiency from the annual expenditure in Montana counties of three and a half million dollars on road and bridge work. From ten to fifty per cent better results can be obtained, it is believed, by the development of road and bridge construction and maintenance standards. It was definitely decided by the commission that all work done for the counties shall be free, expenses of surveys, making of plans and supervisory and advisory work to be borne by the state commission. It is stated that bridge plans and construction supervision have already been furnished by the commission to Beaverhead, Musselshell, Lewis and Clark, Ravalli, Missoula, Cascade, Valley, Madison, Deer Lodge, Lincoln, Rosebud, Mineral, Dawson, Gallatin, Broadwater, Big Horn, Teton, Sheridan, Hill, Yellowstone and Silver Bow counties. Expenses of the commission, from the time of organization up to the first of November, amounted to \$18,000, it is stated.

May Not Transfer Highway Funds.

Carson City, Nev.—In an opinion given to R. K. West, state highway engineer, William McKnight, deputy attorney-general, holds that no part of the money raised by a county tax for highway purposes can be paid into the state treasury for the state highway fund and that no portion of the county highway tax can be used to reimburse any county fund from which the county commissioners have authorized an expenditure for state highway purposes. Several other opinions have been given recently by the attorney-general's office, among them being one to the effect that a private license will not be required for cars used by dealers for demonstrating purposes unless the cars are hired to the public. The question was raised by district attorney Atkinson, of Nye county.

Urges Tax Equalization for Highways.

Harrisburg, Pa.—According to highway commissioner J. Denny O'Neil, who has been making a thorough and extensive tour of the counties of Pennsylvania, much more road construction could be done in the state if county commissioners would revise their methods of fixing property valuations for taxation purposes; and, in addition, it would be possible for these counties to reduce the rate of taxation. The highway commissioner is much in favor of tax equalization. He said: "In many of the counties the assessments are not only too low, but they are not equitable. I find that there is no uniform system of fixing valuations for taxation purposes. In one district assessors will fix the valuation on a basis of 75 per cent actual value; in another, 60 per cent; in another, 80 per cent, and in another, 50 per cent. As a result the property owners in some districts pay more than their share of the taxes, because their valuations are higher than in other districts, while the tax rate is the same for the entire county—for county purposes. These inequalities can easily be remedied through creation of permanent

boards of tax revision, or through the adoption of a system whereby fair and equal assessments can be made. A tremendous increase in the taxable valuation of many counties would result. I am interested in this proposition because it means so much for "the little fellow"—the small property holder, who is found frequently to be paying more than his share of taxes. It is comparatively easy for the assessor to fix the value of a property worth \$2,500 or \$3,000; and the figures returned to the county commissioners usually represent the real value of the small property. But in big properties—office buildings, coal lands and big plants—the assessor return a valuation far too low, because he is not an expert. Suppose in the outskirts of a city there is a small home assessed at \$2,500 and worth \$3,000. On the main street there is a building worth \$200,000 and assessed at \$110,000. The county tax rate is 4 mills. You will readily see that "the little fellow" paying his \$10 is paying more proportionately than the "big fellow" paying \$440. If the valuations had been made equitable the little fellow would pay \$12 and the big fellow \$800. As it is now, it seems to me, there is a great discrimination against the small property owner. If a fair and equitable valuation were made in many Pennsylvania counties you would find the valuation increased 40 per cent or 50 per cent over present figures. This would result in a great addition to the county revenue, on a more equitable basis—so great a revenue, in fact, that a substantial reduction could be made in the tax rate and the county would still have far more money than at this time." The assessment system referred to by the commissioner was given a tryout in Cambria county in 1913. A valuation of \$43,000,000 was increased to \$149,000,000; and the 5-mill tax reduced to 2.

SEWERAGE AND SANITATION

Public Health Council to Coordinate Work.

Cincinnati, O.—The Cincinnati Public Health Council has been organized at a meeting at which sixty organizations and agencies, the work of which is to be coordinated in the program of the new organization, were represented. Health officer Dr. J. H. Landis, in outlining the purpose of the council, said that every advance in public health work in Cincinnati and elsewhere had been made in the face of violent opposition, and that the work in the past had been more or less sporadic and undertaken only in the presence of what might be considered an emergency. "Lack of team work, duplication of effort and expense and the absence of coordination in the programs being followed by the various agencies," said Dr. Landis, "have combined to create a problem, the solution of which is to be the work of the Public Health Council. The solving of this problem will mean the readjustment of programs and budgets and radical changes affecting the material interests of many individuals, but if by putting in operation a joint program which will eliminate duplication of effort, reduce cost of administration and lower sickness, due to removable health hazards, its work will be constructive in character, anything short of which goal spells failure." The following chairmen of the divisional councils, representing the various activities of the organization, were appointed: medical relief, Dr. William H. Peters; industrial health, Anthony Mees; nursing, Miss Laura L. Logan; hospitals, Dr. A. C. Bachmeyer; housing, F. E.

Burleson; social hygiene, Dr. J. F. Williams; tuberculosis, Courtenay Dinwiddie; day nurseries, Mrs. J. O. White; recreation, F. P. Goodwin; infant welfare, Mrs. Ada Stokes; waste, W. C. Folsom; mental hygiene, Prof. Burtis B. Breese. The divisional councils will be organized with representatives from the various agencies throughout the city.

Infant Mortality in Ohio.

Columbus, O.—In Ohio last year a total of 11,059 babies died before completing twelve months of life, according to infant mortality statistics just completed for 1916 by Dr. J. E. Monger, state registrar of vital statistics. This is approximately one death out of every eleven births. One-seventh of all deaths in the state were of infants. As usual the figures show more boys born than girls and a higher infant mortality rate among boys than among girls. This was true in Ohio last year. The number of male infants who died during the year exceeds the number of females by 1,309. Noble and Jefferson counties have the highest rate of infant mortality, one out of every six children dying before completing its first year. In Mahoning, Noble, Jefferson and Summit counties nearly one-fourth of all deaths are of infants under one year of age. Henry county shows the lowest rate, there being only one death for every twenty-nine births, and in Wyandot county only one death for every twenty-three births. Both of these are rural counties.

Closing Schools During Epidemics.

Hartford, Conn.—A recent bulletin of the state department of health gives the following advice to local health officers: "The practice of closing schools upon the outbreak of contagious disease is still followed by some health officers. This method of controlling disease is less efficient and more expensive than the method of individual examination. It is appreciated that public sentiment often demands the closing of schools and that official shortsightedness at times makes it difficult for the health officer to act as he thinks best, but the health officer should put the facts squarely before the people and insist upon official support. For example, if a school of 100 pupils is closed for ten days because of an outbreak of diphtheria, the health officer should show that the average cost per day of educating a child is twenty-five cents and that by closing the schools, a loss of \$250 would be sustained. For one-fifth of this sum, sufficient assistance could be employed to examine and 'culture' every child. Those afflicted with the disease and the carriers could be excluded and the school allowed to continue its sessions. Add to this information that the closing of schools as a method of control is quite often unsuccessful, while the method as described invariably brings results. Of course it is sometimes necessary, where serious outbreaks are threatened, for the health officer to close the schools for a day or two until he can arrange for the admission of pupils under control."

STREET LIGHTING AND POWER

New Lights Installed.

Cincinnati, O.—Progress is being made on the installation of new electric boulevard lights, contracts for the system having been recently awarded by the board of control, through service director Hornberger to the Union Gas and Electric Company at its bid of \$60 per year per light. The standards were approved by the board of control and also by the city planning commission. They are of a new design, the work of city electrician W. O. Kleine, who received the co-operation of the Western Electric Company in working out the details of the standard and globe. The standard is slightly over thirteen feet high from the ground to the light filament. It weighs 400 pounds. The principal feature is in the globe. In the lights being replaced, the globe is topped by a metal ventilator. The plans for the new lights do not provide for a metal ventilator, but the top will be of glass, so made as to well resist heat. This will cause the light to show

its complete outlines when illuminated, as in daylight. The lights are spaced eighty feet apart on both sides of the street, with four lights at street intersections, one at each corner. Those in the square are placed opposite each other. There will be a total of 913 lights. The light will be equally diffused and distributed. The lamps are 615 candle power or about 50 per cent. stronger than the lights being replaced. The standards are made by a Cincinnati firm and are known as the "Cincinnati standards." The lights are to be installed in an unusual manner. The city officials have arranged a plan of having these put in without tearing up the streets on thoroughfares where resurfacing has just been completed. All connections will be made through cellar-ways under the sidewalks, and where there are no cellars the excavation will be made in the sidewalk. At street intersections a conduit will be driven through the street beneath the surface in such a way as not to interfere with the surface.

Vote in Favor of City Buying Plant.

Eaton Rapids, Mich.—In spite of considerable interest taken in the election, less than two-thirds of the normal vote was cast in the regular election at which a proposition to bond the city \$30,000 for the purpose of buying the Smithville water power plant was referred to the voters. The proposition carried by a majority of 59 votes.

City Heat Plant Loses—Asks Higher Rates.

Cleveland, O.—Because it is costing Cleveland taxpayers thousands of dollars every year to supply less than two hundred customers of the city with heat from the Fairmount station, at 35 cents a thousand-pound unit, utilities director Farrell has asked the board of control to authorize the doubling of the rate. According to the department of public utilities, the plant of the city, which was established four years ago at a cost of \$300,000, has lost money from its inception on account of insufficient charge for service. The plant, heat and light commissioner Davis said, supplies steam heat to 196 buildings within a radius of a few blocks from the Fairmount station. He said some of these structures are apartment houses and business blocks. Water commissioner Dusenberre declared the plant since it was opened under the Baker administration had cost the city \$115,195 more than its revenue yielded, due to the inadequacy of the existing rate.

FIRE AND POLICE

Philadelphia Police Force Threatens Strike.

Philadelphia, Pa.—Following protests to the city officials and mass meetings, the city's policemen have threatened to "resign in a body" on New Year's day unless conditions to which they have been long objecting be changed. Eight hundred policemen, representing the membership of the Patrolmen's Benevolent Protective Association in every police station in this city, at an all-day protest meeting, solidly voted "resignation as a body" unless mayor Smith and councils take immediate action on this organization's demands to eliminate politics from the administrative affairs of the department of public safety. Director Wilson of the department of public safety has dismissed the president of the patrolmen's association. The association calls for Mr. Wilson's dismissal, and that of two others, and for the reorganization of the police pension fund. "We must have a man at the head of that who is not controlled by politicians," says the dismissed president. The police say that they can produce affidavits to show that "the men at the top dealt with us through trickery." They are sure that Philadelphians "will stand behind this fight for our rights when they know what is being done to keep ward leaders and district captains in control of the police." An election was about to be held at the time of the protest for the purpose of designating delegates of the men to the board controlling the pension fund. The protective association was successful in electing a small majority of the delegates, but the methods of their superiors in voting the proxies of men who are sick and away at camps aroused the men to a still higher pitch

of anger. Direct charges are made by the policemen that their superiors tried to steal the election. It is the contention that director of public safety Wilson attempted to gain control of the pension fund. It was said that powers of attorney left by policemen with their superior officers so that salaries could be collected were used as proxies, with the result that hundreds of votes were wrongfully cast for administration candidates. The demands of the policemen include:

- Remove politics from police duty.
- Permit policemen to elect their own delegates to the Pension Fund as provided by law.
- Abolish open voting for Police Pension Fund delegates as adopted to keep sergeants and lieutenants friendly to the administration in charge of the fund books.
- Obtain a full accounting of the Pension Fund and make public all the accounts.
- Recognition of the Patrolmen's Benevolent Protective Association by the Mayor and the Department of Public Safety.
- Increase of salary and the establishment of a pay schedule giving patrolmen \$1,400 a year instead of a daily pay of \$3.25, and sergeants \$1,600 a year.
- Abolition of the "ginks," or police spies, detailed to prefer charges against patrolmen who refuse to abide by political orders.
- Abolition of all political assessments.
- Abolition of station house assessments.
- Reorganization of the trial system with full publicity of charges and open inspection of minutes of trials.
- Reorganization of Police Pension Fund, system to provide for a president chosen by delegates from the ranks of the department.
- Retention in the department of men actively associated with the organization of the Benevolent Association.

The seriousness of the situation has been increased by the attitude of the 7,500 members of the home defence reserve. It is known that the members of the reserve are not anxious to be called as strikebreakers.

Police Chief Killed in Fire.

St. Hyacinthe, Que.—The Hotel Dieu hospital was destroyed by fire, but all of the inmates, about 1,000 in number, were removed to safety. Chief of police Foley lost his life while assisting others to escape. Many of the inmates suffered from exposure to the zero weather until accommodations were found for them in houses throughout the town. The hospital population included aged persons and children as well as the sick. The institution consisted of three stone buildings erected at a cost of \$600,000.

City Cleaned Up After Federal Threat.

Columbus, Ga.—Following the appeal of men sent to Columbus by the war department, and solicitor general C. Frank McLaughlin, representing the Muscogee county grand jury, to wipe out the segregated district as a patriotic move in this great crisis, so that the soldiers of the United States army will not become non-effective by double debauchery, the board of police commissioners issued an order to chief J. Tom Moore, instructing him to begin immediately with issuing orders to the inmates in that section of the city to vacate the lewd houses at once. Threatening to place provost guards on every road leading into Columbus, and not allowing soldiers from his camp to come into the city unless the segregated district is cleared of the women, colonel S. B. Stanbury, provost marshal of Camp Sheridan at Montgomery, addressed the police commissioners, stating that Columbus was not "a fit place for the United States soldiers to come into."

Another Big Waterfront Fire.

New York, N. Y.—Six buildings in the great shipbuilding plant of the Morse Dry Dock and Repair Company, extending along the south Brooklyn waterfront, were destroyed by a night fire, perhaps of incendiary origin, which caused damage estimated at \$500,000. Because this plant has been employed exclusively on government work of great importance since this country entered the war, it has been heavily guarded. One company of soldiers has been quartered in the yards and kept constantly on duty. Guards have been kept busy scouring the district back of the yards for enemy aliens. Motor boats have been kept continually patrolling to prevent incendiary attempts from the water side. Attempts to plant bombs in this yard have been reported previously. After sweeping through the carpenter shop, where it began at about

ten o'clock, the blaze spread to several wooden buildings, which had been erected to shelter the soldiers guarding the plant. The fire next attacked the restaurant for employees. As fire-fighting apparatus began to arrive in response to four alarms, other buildings took fire. The fire department, which was under the direction of deputy fire chief John O'Hara, began to concentrate on saving a brick storage house 150 feet long by 75 feet in width, where several thousand gallons of oil were stored. A score of streams of water were kept pouring over the walls to prevent the flames from burning buildings less than 100 feet away from heating the oil inside the storage warehouse to the combustion point. Just before midnight, however, the oil storage building took fire and began to burn fiercely. The firemen had to give over attempts to save the oil and turned their attention to the saving of other buildings. Before one o'clock the fire was declared to be under control and no other buildings had been reached. Soldiers assisted in saving valuable property.

The Halifax Disaster.

Halifax, N. S.—Known dead numbering 1,280, wounded numbering 6,000, hundreds of missing and 25,000 rendered homeless is the toll of a munition ship explosion, which has destroyed a large part of the city. According to reports, the disaster followed the collision, due to mistaken signals, of a Belgium relief ship with a French steamship carrying a thousand tons of explosives. The munitions ship carried benzene, which caught fire after the crash. The crew attempted to put out the flames, but gave up and tried to make for shore. Fifteen minutes later a tremendous explosion shattered half the city—that part near the narrow peak of the channel, where the ship was and which is low land. Fire swept the district. All buildings in a large area were destroyed and thousands of dead and wounded were buried under the ruins. The lighting service of the city broke down and darkness made relief impossible. Three fierce blizzards following each other still further shattered attempts to relieve the stricken city. Cities in Massachusetts, Maine, New York and many other cities in the country rushed relief trains with supplies and doctors. The suffering was indescribable. Refugees and wounded had to be kept in houses without windows through bitter snowstorms. The weather turned relief workers and searchers back under cover and it was four days before the work could be organized.

Fireman Dead After Collision.

San Francisco, Cal.—Three firemen were hurt and three others seriously injured so that one died later as a result of a collision when a United railroads' street car smashed into a hose wagon as it was crossing a street corner on its way to a night fire. The seriously injured were captain John Riley, John Breen and Joseph Coleman, hosemen. The latter died. Both wagon and car were running at high speed, the fire apparatus sounding its gong at full blast. The wagon was squarely struck. Although the wagon was demolished, the horses drawing it were uninjured, but their harness was torn to pieces. Battalion chief Maxwell, who was following in a runabout, took the injured men to the hospital. According to the firemen the car was traveling at the rate of forty-five miles an hour at the time of the crash, without making any reduction of speed for the crossing. According to lieutenant Hensley, who was hurt, the motorman, who was arrested, is the same man who drove a car into truck No. 10 seven months ago, injuring several firemen. One of the men hurt in that accident is still in the hospital.

Segregated District Illegal.

Houston, Tex.—The supreme court at Austin has held void the ordinance of the city of Houston creating a "reservation" or segregated district. The court in its opinion, written by chief justice Nelson Phillips, follows the decision rendered in the case of Spence vs. Fenchler, from El Paso county. It was in the case of J. W. Baker against Sadie Coman et al, from Harris county, that the court rendered its opinion. The supreme court reversed the decision of the court of civil appeals and affirmed that

of the district court of Harris county. In this case Baker had obtained an injunction in the district court for the suppression of resorts, but the court of civil appeals dissolved the injunction. Under the opinion the injunction issued by the district court stands.

GOVERNMENT AND FINANCE

Reorganization of State Civil Service.

Trenton, N. J.—Classification and standardization of offices and readjustment of salaries to fit the work done are recommended in the report on the civil service system of New Jersey, submitted to the State Civil Service Commission by J. L. Jacobs of Chicago, who was appointed by the governor last spring to arrange places in the service according to the work performed. There are 2,568 posts in the state civil service, with an aggregate payroll of about \$2,400,000 a year. The report recommends salary changes aggregating an increase of about \$47,000 a year; but this will be balanced by starting the salaries of holders of certain posts at the minimum instead of beginning a new appointee at the pay which his predecessor was receiving when he ended his service. The report, which is to be embodied in legislative bills now being drawn, reduces the 911 titles for the 2,568 posts to 507, and recommends that the legislature establish the principle of uniform compensation and salary advancement based on service, efficiency and seniority, and for uniform hours of work, vacations, and sick-leave allowances. It also recommends the creation of a Bureau of Personal Service Standards and Records for the purpose of maintaining the classification plan and keeping a record of the service and efficiency of all employees. All officers are to be divided into nineteen functional groups, and in each of these the posts are graded according to responsibility, experience, and skill, with definite stepping stones of promotion from one grade to another.

City Laborers Get Raise.

Portland, Ore.—The city council, acting as a budget committee, has decided that all laborers in the employ of the city shall receive an increase of 25 cents a day. The proposed increase also will affect foremen, park keepers and others working on a per diem basis. Laborers who now receive \$3 a day will get \$3.25 under the new arrangement; park helpers will be paid on the same basis; park keepers will be raised from \$3.50 to \$3.75; assistant park keepers from \$3.25 to \$3.50; gardeners from \$3.50 to \$3.75; attendants of comfort stations, \$2.50 to \$2.75. In the park administration office, the position of engineer is abolished and the salary of superintendent is increased from \$175 to \$200 a month. The position of assistant superintendent at a salary of \$115 was created. There were several slight increases in the salaries of the clerical force, and the keeper of Benson park will receive an increase from \$90 to \$100 a month.

Chicago in Financial Straits.

Chicago, Ill.—Unless a special session of the legislature gives Chicago additional powers toward raising funds the municipality will face a condition practically amounting to bankruptcy next year. The seriousness of the situation was pointed out in a statement from city controller Eugene R. Pike and alderman John A. Richert, chairman of the city council finance committee. The statement shows that the city must raise \$7,500,000 next year in addition to what it receives from all corporate purposes or greatly reduce all municipal operations. The idea of increasing the payrolls rather than cutting them was suggested. Part of the statement, which was sent to all civic organizations in the city, was: "The city of Chicago will face a shortage in its corporate revenues for 1918, due to the failure of renewal of licenses of a large number of saloons and other miscellaneous establishments. The loss on this account to the city will undoubtedly reach \$2,000,000. This shortage may be increased by the loss in the proceeds of taxation of more than \$700,000 unless the findings of the lower court are reversed by the supreme court. Due to

special conditions arising on account of the war situation, the department of police has detailed approximately 500 patrolmen to special purposes, and that department has appealed to the city council for 1,000 additional patrolmen for the year 1918. There is also a necessity for an increase in the fire fighting forces of the city. The health protection forces of the city should also be augmented. These increases are imperative. The city's employees have generally appealed to the city council for increased rates of pay. Materials and supplies used in the operation and maintenance of the city's activities have increased in cost beyond expectation. Briefly summarized, the losses of revenue to the city and the increased cost of operation are as follows:

Loss in licenses.....	\$2,000,000
Loss in taxes.....	700,000
Increased cost of supplies.....	400,000
Demands for increased wages.....	1,800,000
Extra cost of new functions authorized by bond issues.....	600,000
Additional police.....	1,000,000
Additional firemen.....	500,000
Salaries of 600 enlisted city employees.....	500,000
Total	\$7,500,000

"In the face of all the foregoing demands the revenue of the city from taxation has only increased within the last three years on an average of about \$187,000 a year. Unless financial relief is forthcoming, the city controller and the city council will be forced not only to deny any added municipal service which is needed, but will be required to reduce present inadequate police, fire, and health protection service, garbage, ash, and street cleaning service, maintenance of public works, and so forth." The organizations are asked to offer their aid toward having Gov. Lowden call a special session of the legislature.

TRAFFIC AND TRANSPORTATION

Order Straight Five-Cent Fare.

Bridgeton, N. J.—The decision of the Bridgeton and Millville Traction Company to abandon the sale of tickets at the rate of six for twenty-five cents and fifty for \$2 has been sanctioned by the state public utility commission at Trenton. The abolition of these special rates was suspended by the board pending a determination as to the reasonableness of the proposed increase, which will affect about 74 per cent of the road's patrons. The commission says it is not confronted in this case by the question of contract obligations, such as were discussed in cases of the Trenton and Mercer County Traction Corporation and the Northampton, Easton and Washington Traction Company. The decision in the present case rested solely upon the reasonableness of the proposed increases. The commission found that the company does not now obtain and has not for many years received a fair return upon its investment, and even by foregoing the payment of dividends has been unable to acquire sufficient funds for the proper maintenance of its lines. It was also shown the company operates through sparsely settled districts, and its revenues have shown little, if any, increase during a long period of years. In fact, the earnings of the company for the year ended June 30 last were less than those for the year ended June 30, 1907. On the other hand, operating expenses have increased about \$12,500 a year. Of this increase, \$8,000 has been in wages.

Economy of Subways for Cars.

Cleveland, O.—Data just compiled by street railway commissioner Sanders for the newly appointed rapid transit commission, of which he is a member, shows that the building of a subway system downtown would save 195,568 man-hours of labor annually, or \$65,613 in salaries of conductors and motormen alone in present car schedules. This saving would be effected by increasing the speed of cars, according to Sanders, and this could be done by operating cars through three subways in a comparatively small district. To back his assertion of saving, Sanders presents figures showing a comparison of the speed attained by Cleveland street cars in the

district with the speed of Boston cars operating through subways in a downtown district of the same area obtained by many days of careful investigation and traffic checks in Boston and Cleveland by skilled engineers. The table prepared by Sanders shows that cars operate a distance of 3,548,432 miles annually in Cleveland through the downtown district bounded by East and West Ninth streets, Lakeside avenue and Central market. It requires 821,359 hours of labor annually by conductors and motormen to operate the Cleveland cars. In Boston, conductors and motormen work 625,791 hours to cover the same distance in a downtown district of the same area. The Boston subways save 195,568 hours of man labor. In Cleveland the average wage paid motormen and conductors is 33.55 cents an hour. The product is \$65,613, which represents Sanders' estimate of the saving. In the morning rush hours here, the average speed is 8.13 miles an hour, as compared to 10.95 miles an hour in Boston. In the afternoon rush hours, however, when the stores and factories turn out thousands of employees in both cities to be carried home, the speed drops. In Cleveland the rate is 6.60 miles an hour, and in Boston it is 7.85. Cleveland cars travel a total of 1,570,651 miles annually during the rush hours in the small downtown district, and the hours of man labor is 357,927, as compared to 281,691 in Boston, where there is a saving of 76,236 hours of labor each year during the rush hour periods alone.

Utilities Commission Controls Interurbans.

Austin, Tex.—The state railroad commission has issued an order assuming jurisdiction over all of the interurban railway companies operating in Texas. This action, it was said, is due to the commission being advised of an advance in freight and express rates by the interurbans. The commission proposes to regulate in the future all freight and express rates in operation by the interurbans.

Headlight "Dimmer" Law in Effect.

Minneapolis, Minn.—The city's new ordinance regulating headlights on automobiles, motorcycles and other vehicles is now in effect. The ordinance says: "All motor vehicles used or operated upon any street, alley or highway in the city of Minneapolis during the time from one hour after sundown to one hour before sunrise of each day, shall have thereon at least two lights visible from the front on every such motor vehicle that is not a motorcycle, and one light visible from the front on every such motor vehicle that is a motorcycle, and all such motor vehicles shall have at least one red light visible from the rear, and all such front and rear lights shall be visible at a distance of not less than two hundred feet from the vehicle on which they are placed, and during said period from one hour after sundown until one hour before sunrise of each day it shall be unlawful for any person, co-partnership or corporation to use or cause to be used any motor vehicle run or operated on any public street, alley or highway in the city of Minneapolis any lighting device equipped with a reflector unless the glass in front of such light be so etched, ground, frosted, colored, molded or constructed that the lighted filament shall appear blurred or all light emitted therefrom shall be diffused and free from brilliant luster. It shall be unlawful for any person, firm or corporation to operate or manipulate upon the streets, alleys and public places in the city of Minneapolis any detached or dirigible spot light or search light except for the purpose of searching for and finding house and building numbers and road and street signs and for other emergency purposes. The provisions of this section shall not apply in case of vehicles used by or in the service of the hospital, police or fire departments of the city." The civic and commerce association has approved the ordinance and its vigorous enforcement and has issued the following statement advising as to methods of compliance: "Obedience to this law requires no great effort. While the law demands that all glare be eliminated from headlights, this can be accomplished through simple methods, such as the use of soap, paint, paste, etc., or through the substitution of blue or amber glass for plain glass. Those who wish to avoid the possible imperfections

of home mechanics can obtain patented lenses from some twenty manufacturers. It has been found that even superior lenses will, if the lamps are tilted or out of focus, sometimes produce a dangerous glare, which, of course, means prosecution. This ordinance cannot be properly called a dimming ordinance, because it requires that the lenses be treated. The mere act of shutting off bright lights and using only the dim lights is not sufficient. Dimming does not effectively reduce the risk, because it is difficult for a pedestrian crossing the street to see a car with lights dimmed, and on the other hand the driver behind dimmed lights has little opportunity to see the pedestrian or other unlighted objects ahead."

Valuation of Milwaukee Railways.

Milwaukee, Wis.—The state railroad commission has received from its engineering staff, after more than three years of work, a report on the reproduction cost of the physical properties of the Milwaukee Electric Railway & Light Company and Milwaukee Light, Heat & Traction Company. This valuation was made as of Jan. 1, 1914, and showed a reproduction cost on that date of \$37,319,297 for the property of the two companies. The capital expenditures of the two companies during the intervening years up to Jan. 1, 1917, were \$3,206,700. The reproduction cost on Jan. 1, 1917, would accordingly be \$40,525,997. This figure does not include any allowance for working capital or going value. The companies had cash and accounts receivable of \$1,174,000, which, when added to the reproduction cost, gives a total valuation of \$41,699,997. Against this valuation of \$41,699,997 the company had outstanding in the hands of the public and owned by the Wisconsin Edison Company, \$41,006,000 par value of securities, or about \$694,000 less than the reproduction cost of the properties. In order to determine the present value of debt represented by bonds sold at a discount, the unamortized discount may be deducted therefrom. If this is done, the present value of bonded debt and outstanding capital stock and notes is \$39,500,856 as of Jan. 1, 1917, or \$2,199,141 less than the reproduction cost of the properties.

Grade Crossings Cause Many Deaths.

Washington, D. C.—A recent report by the committee on grade crossings and trespassing on railroads of the National Association of Railway Commissioners states that 2,000 persons are killed each year at these crossings, and that there are about 200,000 grade crossings in the United States. This statement is made concerning twenty-two states: "Of the twenty-two states, only nine reported the amount of money expended for elimination work. These figures are so eloquent that we cannot forbear quoting them. For instance, in Illinois the cost of elimination work done is reported as \$55,570,205; in Massachusetts, \$11,962,030; New York, about \$44,000,000; New Jersey, \$6,000,000; Vermont, \$1,003,625; Maine, \$216,804; Missouri, \$330,000, with \$967,000 unexpended for work already ordered; Oregon, \$136,042, with an additional \$633,375 to be spent, and Virginia, \$66,317." The report says that out of 10,785 trespass accidents of 1914, 3,437 happened to those between the ages of 21 and 30 years. "In other words," says the report, "in these 3,437 accidents some 3,000 men within the draft age were killed and injured. The country has an economic interest in the life and health of every individual of the 10,000 who are killed and injured, regardless of whether they are or are not of military age, but, after all, humanitarian rather than economic reasons make the stronger appeal to us."

Jefferson City, Mo.—Accidents at grade crossings in this state are increasing despite added protection and educational campaigns by the railroads. T. H. Bradbury, secretary of the state public service commission, has issued a report covering accidents during the fiscal year ended June 30, 1917. He says that during the fiscal year ended June 30, 1916, there were 22 accidents caused at grade crossings, resulting in death to 6 persons and injuring 43. For the fiscal year ended June 30, 1917, however, there were 30 accidents resulting in death for 19 persons and injuring 48.

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading English, French and German ones, dealing more or less directly with municipal matters. The Index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on municipal matters. In furtherance of this we will furnish any of the articles listed in the index for the price named after each article, except that where an article is continued in two or three issues of the paper, the price given is for each of said issues. In addition to the titles where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article.

ROADS AND PAVEMENTS.

Asphalt:

Asphalt Block Pavements on Sand. Method of laying and detailed cost of construction in Savannah, Ga. 500 words. Municipal Journal, November 22. 10 cts.

Assessments:

The Apportionment and Assessment of Paving Costs in New Orleans. Method where practically the entire cost is borne by the property owners. 1,000 words. Good Roads, November 3. 10 cts.

Bituminous:

Bituminous Macadam by the Penetration Method. From a paper by I. W. Patterson, Chief Engineer of Rhode Island Board of Public Roads. 4,000 words. Good Roads, November 24. 10 cts.

How a Tar Mat is Applied to Concrete Road Base in Maine. 600 words. Engineering News-Record, November 29. 15 cts.

Brick:

Old Brick Resurfaced with Thin-Base Monolithic Brick. Use of 3-inch block proves satisfactory. On future work the experimental use of a 2-inch block is proposed. By H. H. Edwards, Highway Engineer. 4 ills. 1,200 words. Engineering News-Record, November 1. 15 cts.

Tests Show Advantages of Laying Brick Directly on Concrete Base. Research work at University of Illinois justifies the assumption that the strength of such a slab is the same as that of an equal thickness of concrete. By C. C. Wiley, instructor in highway engineering. 5 ills. 3,000 words. Engineering News-Record, November 1. 15 cts.

Concentration of Expansion Stresses Due to Imperfect Grouting the Cause of Brick Pavement Failures. By C. C. Wiley, instructor in highway engineering, University of Illinois. 3 ills. 1,000 words. Municipal Engineering, November. 25 cts.

Concrete:

Reinforced Concrete Pavement with Bituminous Block. By H. J. Hanmer, City Engineer of Gloversville. 1 ill. 1,500 words. Cement & Engineering News, November. 20 cts.

Concrete Highway Construction in Illinois. Equipment employed by contractors in Vermilion County. Graders, scrapers, industrial railway and unloaders used. No shoveling of aggregate from cars to mixers. Engineers keep records. 5 ills. 4,000 words. Municipal Journal, November 22. 10 cts.

Spool Roller for Concrete Pavement. By Frank Yocum. 1 ill. 250 words. Municipal Journal, November 15. 10 cts.

Board Float for Finishing Concrete Streets. 1 ill. 200 words. Municipal Journal, November 15. 10 cts.

Pipe Used to Roll Concrete, Rolling Transversely. 1 ill. 300 words. Engineering News-Record, November 1. 15 cts.

Expansion and Contraction of Concrete Roads. Change in moisture content. Effect of variation in temperature. Conclusions, based upon expansion and contraction measurements. 1,500 words. Engineering and Contracting, November 7. 10 cts.

Plans to Cut Paving Gang in Half. With train of steam roller, derrick, traveling bins and paving mixer wheeling gang is eliminated on concrete pavement and pavement base construction. 2 ills. 1,000 words. The Contractor, November 9. 10 cts.

Building State Aid Concrete Road Near Grand Rapids, Mich. Stiff concrete is used, floated by hand and finished with a belt. Teams and motor trucks do the hauling. 1,500 words. Engineering News-Record, November 29. 15 cts.

Wayne County Board Reports on Concrete Roadwork. Two-course construction still practised because of the scar-

city of good pebble aggregate and road shoulders macadamized. 1,200 words. Engineering News-Record, November 22. 15 cts.

Heavy Screed Gets Quick Results on Concrete Road. Five men level, screed and finish 500 sq. yds. a day. Long-handled float, then belt and finally roughing brush follow. 4 ills. 700 words. The Contractor, November 9. 10 cts.

Method of Concrete Road Construction in Wood County, West Virginia. From a paper by Burdette Woodyard, County Engineer. 1,500 words. Good Roads, Nov. 17. 10 cts.

The Cracking and Buckling of Cement Concrete Pavements. Data concerning 3 concrete roads in Long Island. By H. T. Tuthill, County Assistant Engineer. 4 ills. 1,000 words. Good Roads, November 17. 10 cts.

Cold Weather Construction of Concrete Roads. Effect of temperature on the strength of concrete. By D. A. Abrams. 1,500 words. Concrete Highway Magazine, November. 10 cts.

Reinforced Concrete Roads in Sheffield. Method of construction and performance of roads built some time ago. By W. J. Hadfield, City Surveyor. 2 ills. 1,100 words. The Surveyor, October 19. 40 cts.

Rope-Pulled Roller Finishes Concrete Road. 2 ills. 500 words. The Contractor, November 23. 10 cts.

Concrete Roads in Wood County, West Va. Paper by Burdette Woodyard, County Engineer. 4,000 words. Better Roads & Streets, November. 15 cts.

Construction:

Road Drag Used in Gravel Road Construction. Description of drag used successfully in Wisconsin. By J. C. Worrell. 1 ill. 500 words. Engineering & Contracting, November 7. 10 cts.

Building Roads in the Everglades. Conditions and difficulties encountered in locating old section line corners and in constructing the road. Local clay materials were used for surfacing. By Selden L. Stewart. 3 ills. 1,250 words. Municipal Journal, November 29. 10 cts.

Making Cuts in Pavements. Pneumatic tools used in San Francisco. 1 ill. 400 words. Municipal Journal, November 1. 10 cts.

Interurban Line Hauls Materials for Concrete Roads. Delivers and spots concrete materials. 1 ill. 500 words. The Contractor, November 23. 10 cts.

Sequence of Machine Operations in Trenching Asphalt Pavements. 2 ills. 400 words. The Contractor, November 9. 10 cts.

Reconstruction of the Eaton Model Highway. Change in traffic conditions in 8 years necessitates substitution of hot-mix bituminous concrete for water-bound macadam. Motors now average 70 per cent of traffic on the roads instead of 10 per cent, as in 1909. 8 ills. 2,750 words. Canadian Engineer, November 29. 15 cts.

Convicts:

Convict Labor on Road Construction in Massachusetts. 1,500 words. Engineering & Contracting, November 7. 10 cts.

Costs on Road Work by Prison Labor in Kanawha County, West Virginia. Average number of prisoners employed, cost of food and total cost of camp. By A. D. Williams, State Highway Engineer. 3 ills. 1,000 words. Good Roads, Nov. 24. 10 cts.

Prison Labor is Efficient. West Virginia Highway Commission given an example of the work done in Kanawha County. 3 ills. 1,100 words. Southern Good Roads, November. 10 cts.

Costs:

Comparative Costs of Oregon Pavements. Cost of bitulithic redress and asphaltic concrete redress, of laying bitulithic and asphaltic concrete on a crushed rock base, of laying bitulithic

and asphaltic concrete on a 5-inch concrete base and of constructing concrete pavements. 1,500 words. Engineering & Contracting, November 7. 10 cts.

Design:

Street and Boulevard Planning. By L. McLaren Hunter. 9 ills. 1,250 words. Cement Era, November. 20 cts.

Considerations Governing the Choice of the Various Types of Road Construction. From a paper by L. V. Edwards. 3,000 words. Good Roads, November 3. 10 cts.

Considerations Governing the Choice of the Various Types of Road Construction. 1,500 words. Engineering & Contracting, November 7. 10 cts.

Drainage:

Frost Breaks in Macadam Roads Due to Inadequate Drainage. By Frank P. Arnold. 2 ills. 1,000 words. Engineering News-Record, November 15. 15 cts.

Some Drainage Problems Encountered on Maine Highways. By H. Walter Leavitt. 6 ills. 1,000 words. Good Roads, November 10. 10 cts.

Finance:

Serial Bonds for Road Building. Letter from R. A. McCulloch. 1,000 words. Engineering News-Record, November 29. 15 cts.

General:

War's Influence on British Roadwork Discussed in Report. British Road Board states that heavy motor traffic has damaged highways and that maintenance has been deferred. Much reconstruction promised for after the war. 2,500 words. Engineering News-Record, November 8. 15 cts.

Tests of Concrete Road Aggregate. Abstract of paper by J. P. Nash before American Society for Testing Materials. 2,700 words. Canadian Engineer, November 22. 15 cts.

How Road Material Embargo Will Affect Construction. Opinions of various state highway officials. 1,800 words. Engineering News-Record, November 15. 15 cts.

Condition of Roads in English City Discussed by Engineer. Work in Sheffield described. Maintenance is chief work. Tar spraying is recommended. 1,500 words. Engineering News-Record, November 29. 15 cts.

Opening of Toronto-Hamilton Highway. Origin, history and development of work. 2,300 words. Canadian Engineer, November 29. 15 cts.

Hard Pavements are Replacing Dusty Adobe Roads in Western Texas. Bituminous type favored; gravel used on secondary roads and concrete laid under 5-year guarantee. 2 ills. 2,200 words. Engineering News-Record, November 15. 15 cts.

Street Work in Springfield. Review of the work accomplished in the past four years. 1,500 words. Good Roads, November 10. 10 cts.

Extent of Rural Roads. Figures from U. S. Office of Public Roads. 700 words. Municipal Journal, November 1. 10 cts.

Are Small Contracts Desirable Now? What state highway officials think of the matter. 1,500 words. Better Roads & Streets, November. 15 cts.

The Highway and Its Relations to Transportation. From an address by S. M. Williams. 1,000 words. Good Roads, November 10. 10 cts.

Hauling:

Hauling Road Gravel by Teams and Tractors. Some cost figures from experiences in Minnesota. 600 words. Municipal Journal, November 1. 10 cts.

Joints:

Concealed Joints in Georgia Roads. Practice in Fulton County, Ga. By W. T. Wilson, County Highway Engineer. 2 ills. 1,100 words. Concrete Highway Magazine, November. 10 cts.

Machinery:

Effective Use of Road Machinery on

Gravel Roads. Experience in McHenry County, Illinois. 1,000 words. American City, November. 50 cts.

Maintenance:

Maintenance and Repair of Improved Roads. Brick pavements, bituminous surfaced concrete and bituminous macadam. Patrol system of maintenance. Lessons from Ohio Experimental Road. By C. C. Brown. 1 ill. 3,000 words. Municipal Journal, November 15. 10 cts.

Road Maintenance is Receiving Attention in Wisconsin. 1,000 words. Engineering News-Record, November 8. 15 cts.

Methods of Renewing Surface of Old Macadam Roads. 1,000 words. Engineering & Contracting, November 7. 10 cts.

Concrete Road Repairs in Wayne Co., Michigan. Method used in repairing concrete roads. 750 words. Good Roads, November 24. 10 cts.

Resurfacing:

Resurfacing Roadways with Tar-Macadam, Cold Mix. Results in Ohio. By J. S. Crandell. 3 ill. 800 words. Municipal Engineering, November. 25 cts.

Conserving the City's and County's Assets by Utilizing Old Pavements as Foundations for New Surfaces. Discusses repair of old macadam roads and resurfacing them with a bituminous top. 6 ill. 1,000 words. Municipal Engineering, November. 25 cts.

Resurfacing Defective Road Sections. Methods of the Illinois state highway officials. By B. H. Piepmeier. 2 ill. 1,000 words. Concrete, November. 20 cts.

Sand-Hay-Tar:

Experiment of Wisconsin Highway Commission in Improvement of Sand Roads by Hay and Tar Mats. By H. J. Kuelling, Assistant to State Highway Engineer. 3 ill. 1,500 words. Engineering & Contracting, November 7. 10 cts.

Experiment on Sand Roads by the Wisconsin Highway Commission. By H. J. Kuelling. 3 ill. 1,700 words. Good Roads, November 3. 10 cts.

Sand-Hay-Tar Experimental Road. By John S. Crandell. 3 ill. 1,000 words. Canadian Engineer, November 15. 15 cts.

Slag:

An Experimental Slag Macadam Road in Greenup County, Kentucky. Description of method of construction and result of 8 months' wear. By C. S. Bennett. 2 ill. 1,000 words. Good Roads, November 10. 10 cts.

State:

The Work of the Massachusetts State Highway Commission During 1916. 1,500 words. Engineering & Contracting, November 7. 10 cts.

As a Contractor Sees New York State's Road Situation. State Highway Commission's methods should be changed to meet new and unforeseen conditions. By D. W. Robbins. 1,500 words. Engineering News-Record, November 29. 15 cts.

Hard-Surface Pavements for State Highways. In selecting road types engineer must recognize the demand for all-year service and for heavy motor truck traffic. By C. J. Bennett, State Highway Engineer, Connecticut. 1 ill. 2,500 words. Engineering News-Record, November 22. 15 cts.

Florida's Improved Roads. By Wm. F. Coker, State Highway Commissioner. 1 ill. 1,000 words. Southern Good Roads, November. 10 cts.

Surveys:

Speedy Road Condition Survey by Auto at \$1.20 a mile. Wisconsin Highway Commission collects data on 7,500 miles of road as basis for new trunk route system. 2,500 words. Engineering News-Record, November 15. 15 cts.

The Wisconsin Survey of Road Conditions. Methods used and results obtained. 1 ill. 2,000 words. Good Roads, November 17. 10 cts.

Methods Employed by the Wisconsin Highway Commission in Making Condition Survey of State Trunk Highways. By A. R. Hirst, State Highway Engineer. 1 ill. 2,000 words. Engineering & Contracting, November 7. 10 cts.

Tracks, Railway:

Methods and Materials for Paving Between Street Railway Tracks. The fifth in a series of articles. This one describes the practice in New Orleans. By M. V. Haulard. 2 ill. 1,500 words. American City, November. 50 cts.

Concrete Paving Between Car Tracks. Practice in Metamora, Ohio. By A. Swartz. 1 ill. 600 words. Concrete Highway Magazine, November. 10 cts.

SEWERAGE, DRAINAGE AND SANITATION.

Activated Sludge:

The Treatment of Packing-House Wastes by Activated Sludge Process. Abstract of paper by Langdon Pearce. Testing station described; summary of activated sludge results; arrangement of tanks; stability of effluent; air distribution; baffling and agitation; sludge settlement and treatment; analyses; screening; recoveries; developments. 4,000 words. Engineering & Contracting, November 14. 10 cts.

Conclusions on Activated Sludge Process at Milwaukee. T. Chalkley Hatton discusses many features of sewage treatment work. He believes with a large plant that sludge can be disposed of at a profit. 5,000 words. Engineering News-Record, November 1. 15 cts.

Handling Sludge from Activated Plants. Conclusion from operation of test plants at Chicago and Ft. Worth. Settling, coagulating and pressing. Possible developments. 1,000 words. Municipal Journal, November 22. 10 cts.

Activated Sludge Tests Made by California Cities. Process competes with Imhoff tank and sprinkling filters to produce effluent for use on joint sewage farm. 4 ill. 1,800 words. Engineering News-Record, November 29. 15 cts.

Construction:

Contractor's Methods on Large Sewer Construction. Timber system in tunnel permits casting of the concrete in an entire wall section, including the arch. Materials handled by gravity. 7 ill. 2,500 words. Cement Era, November. 20 cts.

Laying Iron Pipe Sewer in White Plains. Twenty-four inch cast iron pipe used because of ground water. Trench, 8 to 18 feet deep, dug with an excavator, no sheeting being used. Tunneling under railroad. By C. P. Abbott, Deputy Commissioner of Public Works. 3 ill. 2,000 words. Municipal Journal, November 15. 10 cts.

Drainage:

Drainage in the Red River Valley in Manitoba. From a paper by G. B. McColl. 4 ill. 2,000 words. Canadian Engineer, November 8. 15 cts.

Reclamation of Alkaline Lands. Abstract from recently issued bulletin of U. S. Office of Public Roads, by R. A. Hart, Senior Drainage Engineer. 1,000 words. Engineering Contracting, November 14. 10 cts.

Manholes:

Drop Manholes for Sewers. From a paper before the Municipal Engineers of New York by I. W. Whittemore. 2 ill. 1,200 words. Canadian Engineer, November 1. 15 cts.

Operation:

Making Sure of Proper Operating Methods at York, Pa., Sewage Treatment Plant. Description of plant; operations. 3 ill. 3,000 words. Municipal Engineering, November. 25 cts.

State Control Over the Operation of Sewage Treatment Works. Reports of Committee of American Public Health Association given in abstract. 1,500 words. Engineering & Contracting, November 14. 10 cts.

Run-Off:

Run-Off Records for Two Sewerage Areas Show Contrasts. Heavy rainfall of Seattle followed by running time of 20 minutes in one area and 160 minutes in another. By H. D. Silliman. 3 ill. 1,000 words. Engineering News-Record, November 15. 15 cts.

Sanitation:

Auto-Eductor is Used to Clean Chicago Catch Basins. Are found to be much quicker and cheaper than hand labor. Motor trucks can be converted into ordinary trucks for other work. 1 ill. 1,200 words. Engineering News-Record, November 29. 15 cts.

The Effect of the War on Municipal Engineering and Public Health. From a paper by H. Percy Bulnois. 3,500 words. The Surveyor, October 26. 40 cts.

Testing Stations:

Sewage Testing Stations. Suggestions for the construction and operation of such stations. Building tanks and other apparatus and selecting machinery. Cost of stations. Abstract of paper by Langdon Pearce. 3 ill. 2,500 words. Municipal Journal, November 1. 10 cts.

New Haven Tests Five Processes of Sewage Treatment. Activated sludge, Imhoff tank, Miles acid tank, screening

and chlorination studied at experiment station. 1,250 words. Engineering News-Record, November 1. 15 cts.

Sewage Experiment Station of New Haven, Conn. Description of the plants in use for testing five methods of treatment. 2 ill. 1,200 words. Engineering & Contracting, November 14. 10 cts.

Treatment:

Screens, Filters and Humus Tanks for Indianapolis. Imhoff tanks and sprinkling filters and activated sludge process eliminated. Non-putrescible effluent for river will cost \$3,000,000. 2,500 words. Engineering News-Record, November 22. 15 cts.

Disinfection of Sewage by Copper Salts. Results of experimental plant now in operation in New Haven, Conn. 1 ill. 2,500 words. Engineering & Contracting, November 14. 10 cts.

Sewerage System for a Small Town. Screen, septic tank, coke filter, settling tank, and chlorine treatment. Pumping station was necessary to serve a low district. Trench excavation by machinery. Mixing and distributing concrete. 5 ill. 1,500 words. Municipal Journal, November 29. 10 cts.

Standard Plans for Army Camp Sewage Disposal. Single-story septic tanks, trickling filters, intermittent sand filters and chlorination employed as local conditions demand. 1 ill. 1,000 words. Engineering News-Record, November 15. 15 cts.

Sewage and Its Precipitation. Results of further experiments are described. By Reginald Brown. 2 ill. 5,000 words. The Surveyor, October 26. 40 cts.

WATER SUPPLY.

Construction:

Cableway Handles Relining of Cleveland Water Basin. Filtered water reservoir reinforced with 18,000 yards of concrete, placed without erecting construction plant on roof. 4 ill. 1,800 words. Engineering News-Record, November 22. 15 cts.

Filtration:

Filtration Plant at Aylmer, Quebec. Crushed marble mixed with silica sand used as filtering medium in gravity type of mechanical plant. From a paper by H. L. Seymour. 8 ill. 3,800 words. Canadian Engineer, November 1. 15 cts.

Flow:

Intake and Outflow Velocities. Effect of mouthpieces or of flaring ends on pipes and conduits in reducing loss of head. Application to turbines and pumps. From bulletin of Illinois Experiment Station. 1,250 words. Municipal Journal, November 1. 10 cts.

Intake and Outflow Velocities. Abstract of bulletin of University of Illinois. 1,400 words. Canadian Engineer, November 15. 15 cts.

Flow Conditions in Flumes. Observations show that where water flows at a high velocity investigations should be made before final designs are adopted. By John S. Longwell. 2 ill. 1,200 words. Canadian Engineer, November 15. 15 cts.

General:

Procedure in Maintenance and Operation of McPherson, Kansas, Water and Electric Plant. By Arthur Groesbeck, Superintendent. 4 ill. 1,800 words. Municipal Engineering, November. 25 cts.

Solving the Water Supply and Sewerage Problems at the Camp Pike Cantonment. By E. B. Black, of Black & Veatch. 6 ill. 1,200 words. Municipal Engineering, November. 25 cts.

New Features in the Charter of a Water Board. From a paper by Scotland G. Highland. 1,800 words. Canadian Engineer, November 1. 15 cts.

A Sanitary Interpretation of Water Analysis. By E. C. Richardson. 2,700 words. Canadian Engineer, November 8. 15 cts.

Fallacies in Investigation of Water Supply. By A. H. Whittaker. 1,000 words. Canadian Engineer, November 29. 15 cts.

Joints:

Cement Joints for Cast Iron Water Mains. Discussion of subject before American Society of Civil Engineers. 1,900 words. Canadian Engineer, November 1. 15 cts.

Pipes and Mains:

Tests Show Tightness of Flexible Joint Pipe Across New York Harbor. 500 words. Engineering News-Record, November 15. 15 cts.

Flexible Joint Pre-Cast Concrete Pipe Laid Below Water in Lake Erie. At Lakewood, Ohio, flexible joints are iron castings and sections comprise five con-

crete pipes. At Cleveland, single pipe with concrete ball and socket joints were used. 7 ill. 1,800 words. Engineering News-Record, November 8. 15 cts.

Using Permanent Concrete Covering to Prolong the Life of Steel Pipe. Method of covering California pipe line. Cost. 1 ill. 800 words. Municipal Engineering, November. 25 cts.

Creosoted Wood Stave Pipe. Interesting features of the creosoting of wood stave pipe. From a paper by O. P. M. Goss. 1,100 words. Engineering & Contracting, November 14. 10 cts.

Modern Practice in Wood Stave Pipe Design and Suggestions for Standard Specifications. Discussion of paper by J. F. Partridge before A. S. C. E. 2 ill. 3,300 words. Canadian Engineer, November 15. 15 cts.

Breaks in Water Mains. From a paper by S. E. Killam. 1,000 words. Canadian Engineer, November 15. 15 cts.

Pumps:

Testing Chicago's New Centrifugal Pumps. Two 30,000,000-gallon steam turbine, reduction gear centrifugal pumps equipped throughout with hydraulic-driven auxiliaries. 7 ill. 4,000 words. Power, November 6. 5 cts.

Single Stage Pumping Unit Operates at High Efficiency Under Unusual Variations of Head and Capacity. 1 ill. 800 words. Canadian Engineer, November 29. 15 cts.

Reservoirs:

Steel Water Tank Encased in Ornamental Concrete Shell. Method of constructing concrete lining for Cincinnati tanks. 2 ill. 1,000 words. Engineering & Contracting, November 14. 10 cts.

Concrete Water Tank and Tower. Recent construction at New Trier, Minn. 100 words. Municipal Journal, November 22. 10 cts.

St. Paul Concrete Reservoir Has Unique Side-Wall Design. Hollow gravity wall section similar to that used in a dam. Specifications control construction features. Twisted steel reinforcement barred. By W. M. Jones, Engineer of design and construction. 2 ill. 2,200 words. Engineering News-Record, November 15. 15 cts.

Casing a Steel Frame Tower with Concrete. 3 ill. 600 words. The Contractor, November 9. 10 cts.

Mammoth Reservoir Built by Efficient Methods. Construction of reinforced reservoir in the Highland Park, Mich. Steel forms were used. 9 ill. 2,200 words. Cement Era, November. 20 cts.

Treatment:

Removal of Manganese from Water Supply. Abstract of thesis by H. P. Corson. 1 ill. 2,600 words. Canadian Engineer, Nov. 22. 15 cts.

Ultra-Violet Rays Finish Treatment of Henderson Water Supply. Sedimentation, mechanical filter and ultra-violet purification plant has been in service several months in a Kentucky town. New form of sterilizer used. Typical bacterial results. By A. P. Smith. 5 ill. 1,500 words. Engineering News-Record, November 29. 15 cts.

Interesting Municipal Installation of Ultra-Violet Ray Sterilizer. 3 ill. 1,100 words. Canadian Engineer, November 29. 15 cts.

Removal of Manganese from Water Supplies. Abstract of paper by H. P. Corson, Illinois Water Survey. 1 ill. 5,000 words. Engineering & Contracting, November 14. 10 cts.

Trenching:

Trenching at Low Cost. 100 words. Municipal Journal, November 1. 10 cts.

Using the Air Compressor on Trench Work in New York City. By C. L. Edholm. 5 ill. 1,000 words. Municipal Engineering, November. 25 cts.

Valuation:

A Discussion of the Fundamental Principles of Water Works Valuation. From a paper by J. W. Ledoux before Engineers' Club of Philadelphia. 1 ill. 5,500 words. Engineering & Contracting, November 14. 10 cts.

Water Supply:

Group of Small Towns Get Together on the Water Problem. Municipalities on the North Shore of San Francisco Bay have engaged an engineer to lay out the development. 1,000 words. Engineering News-Record, November 8. 15 cts.

A Metropolitan Water and Sewerage Project for Six Canadian Municipalities. By Charles Lenly Barker. 1 ill. 3,000 words. American City, November. 50 cts.

Water Conditions in Los Angeles. Detailed description of water system by National Board of Fire Underwriters. 1

ill. 2,500 words. Fire & Water Engineering, November 14. 10 cts.

Wells:

Unsandring Two Deep Wells. Special expedients necessary to remedy faults that were introduced by drilling without engineering supervision. By W. C. Hammett. 2 ill. 2,000 words. Engineering News-Record, November 1. 15 cts.

STREET LIGHTING AND POWER.

Chimneys:

Controlling Smoking Chimneys. Tells of the efforts of a large power plant to assist in the prevention of smoke. A record is kept of the smoke from the chimneys and the fireman is signaled when his furnace is making black smoke. 4 ill. 1,200 words. Power, November 27. 5 cts.

Heating and Cooking:

Some Features in the Design of Domestic Electric Ranges. By J. L. Shroyer. 14 ill. 5,000 words. General Electric Review, November. 20 cts.

Heating Water Electrically. Practice of cities in the Northwest in regard to kind of heater, insulation, wiring and cost. 1,500 words. Municipal Journal, November 22. 10 cts.

Lighting:

Street Lighting in Richmond, Va. Municipal plant shows great saving to city during 5 years' operation. Advantages and efficient life of incandescent lamps. 1,000 words. Municipal Journal, November 1. 10 cts.

New Park and Boulevard Lighting in Chicago. Single and 2-light ornamental units for Grant Park and Michigan Boulevard. 3 ill. 1,000 words. Electrical Review, November 10. 10 cts.

The Automobile Head-Lighting Problem Again. Treats the problem of automobile head-lighting from the point of view of all classes. By E. J. Edwards. 4 ill. 2,000 words. General Electric Review, November. 20 cts.

Rates:

Low Electric Rates in Los Angeles. By C. W. Geiger. 1,000 words. 1 ill. Municipal Journal, November 22. 10 cts.

Effect of Increased Costs on Central Station Rates. A compilation of statistics showing how increased costs of fuel, labor and material have increased cost of serving power customers. 2 ill. 3,000 words. Electric Review, November 10. 10 cts.

Services:

Overhead and Underground Service Installations. Review of present practice in making service installations with the idea of relieving the streets as far as possible of overhead wires. By E. B. Meyer. 8 ill. 3,000 words. Electrical Review, November 3. 10 cts.

Power Plants:

Winnipeg River Water Power Plants. Description of the 3 plants. 900 words. Canadian Engineer, November 8. 15 cts.

FIRE.

Apparatus:

Motor Apparatus in Service. Lists motor fire apparatus in service in about 500 cities. 4 pages. Municipal Journal, November 29. 10 cts.

Miscellaneous:

Los Angeles, California, Fire Department. Report of National Board of Underwriters. 2,200 words. Fire & Water Engineering, November 7. 10 cts.

Horizontal Versus Vertical Exits from Buildings. 2,500 words. Fire & Water Engineering, November 7. 10 cts.

Pensions and Benefits:

Firemen's Pensions and Benefits. Data covering pension funds, proportion contributed by city and association, inspection, etc. 2 pages. Municipal Journal, November 15. 10 cts. 3½ pages. Municipal Journal, November 22. 10 cts.

Firemen's Pensions and Benefits. Information concerning these furnished by several cities. How funds are raised and systems of payment. 1,200 words. Municipal Journal, November 29. 10 cts.

Preventions:

State Fire Marshal Laws. Synopsis of Pennsylvania laws, which contains most of the provisions common to a majority of the state laws. 1,250 words. Municipal Journal, November 8. 10 cts.

The State Fire Marshals. Description of the work of their respective departments furnished by the marshals of 19 states. Powers, aims and accomplishments. 6,750 words. Municipal Journal, November 8. 10 cts.

Fire Prevention. Work done by state and national organizations. Inspection by local firemen and aid from federal

department. 1,000 words. Municipal Journal, November 8. 10 cts.

The New York Bureau of Fire Prevention. Organization and jurisdiction; work performed by each of the several divisions. Supervision of structure of buildings and auxiliary fire appliances. Electrical inspection. Educational work. By Robt. Adamson, Fire Commissioner of New York City. 5 ill. 4,500 words. Municipal Journal, November 8. 10 cts.

Fire Marshal Department of Ohio. The work, duties and powers of the Fire Marshal. Startling results following the declaration of war. Keeping records. By T. Alfred Fleming, State Fire Marshal, Ohio. 7 ill. 3,500 words. Municipal Journal, November 8. 10 cts.

New York Bureau of Fire Prevention. Work done by the electrical division, division of examiners, division of plan room and recording division. (Continued from November 8 issue). By Robert Adamson. 2,000 words. Municipal Journal, November 15. 10 cts.

Statistics:

Fire Department Statistics. Information concerning population and area of city, number of regular men, percentage of volunteers, salary and increases granted during the past year; also organization of fire prevention work, power to enforce ruling, and accomplishment of bureaus. 13 pages. Municipal Journal, November 8. 10 cts.

MOTOR VEHICLES.

Industry's Use of Highways and Motor Trucks to Relieve Freight Congestion. Statements from manufacturers and trucking companies concerning the use of motor trucks for hauling purposes. Many firms with war contracts use the roads for hauling raw materials and delivering the finished products. 2,400 words. Engineering News-Record, November 29. 15 cts.

Steam Motor Wagons. Operating cost. 500 words. The Surveyor, October 26. 40 cts.

Some Specific Examples of Truck Performance on Contracting Work. 900 words. Cement & Engineering News, November. 20 cts.

The Cost of Motor Trucking. 1,200 words. Cement & Engineering News, November. 20 cts.

Application of a Trailer to the Truck. Some figures of operating cost of a 5-ton truck compared with a 5-ton trailer. 2 ill. 1,600 words. Better Roads & Streets, November. 15 cts.

STREET CLEANING AND REFUSE DISPOSAL.

Street Cleaning in Cincinnati. Abstract of 1916 report. 800 words. Municipal Journal, November 1. 10 cts.

Municipal Work in Savannah. Methods and costs of cleaning the various kinds of streets. Collecting and disposing of refuse. Use and sale of materials. 1,500 words. Municipal Journal, November 29. 10 cts.

Electricity Promotes Economy in Street Refuse Disposal. New York City has modern motor-driven street cleaning and refuse hauling equipment. 3 ill. 1,500 words. Electrical Review, November 10. 10 cts.

Conserving 80,000,000 Pounds of Industrial Wastes a Year. By W. Rockwood Conover. 6 ill. 4,000 words. General Electric Review, November. 20 cts.

How Worcester is Helping to Conserve the National Food Supply. Data concerning the operation of one of the largest and oldest municipal piggeries in the United States. By Frederic Bonnet, Jr. 7 ill. 4,000 words. American City, November. 50 cts.

New Piggery in Topeka Utilizes Garbage. Steel cans are transferred from collecting wagons to motor trucks for delivery to farm. 2 ill. 1,100 words. Engineering News-Record, November 8. 15 cts.

Contract Plans and Specifications for Obtaining Refuse Incineration Works on the Most Economical Basis. Inter-relationship of plant design and operation and refuse collection. Getting bids; specific guarantee. Proper tests. By Rudolph Hering. 3,000 words. Municipal Engineering, November. 25 cts.

CITY PLANNING.

City Planning in Pasadena. Progress report of city planning committee. Baling on proposed improvements. 1,300 words. Municipal Journal, November 15. 10 cts.

(Continued on page 596)

NEWS OF THE SOCIETIES

Calendar of Meetings.

Dec. 26-29.—AMERICAN POLITICAL SCIENCE ASSOCIATION. Annual meeting, Philadelphia, Pa. Secretary, Clinton J. Swartz, Trenton, N. J.

Dec. 27-29.—AMERICAN SOCIOLOGICAL SOCIETY. Annual meeting, Philadelphia, Pa. Secretary, Scott E. W. Bedford University of Chicago, Chicago, Ill.

Jan. 3, 4.—NEW JERSEY STATE LEAGUE OF MUNICIPALITIES. Annual convention, Trenton, N. J. Secretary, Clinton A. Swartz, Trenton, N. J.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d Street, New York, N. Y.

National Municipal League.

The recent annual meeting of the league was held in conjunction with the Society for Training for Public Service, the City Managers' Association and the Municipal Research conference and formed the 25th National Conference for Good Government. The sessions were held in Detroit, Nov. 21-23, with headquarters at the Hotel Statler.

At a luncheon held on Wednesday, the question "Will the City Manager Form of Government Fit All Cities—Large Cities—Machine Controlled Cities?" was discussed by Richard S. Childs, New York; Gaylord C. Cummin, Grand Rapids; George B. Harris, Cleveland; Lent D. Upson, Detroit; Ossian E. Carr, Niagara Falls; Henry M. Waite, Dayton, and George W. Knox, Niagara Falls.

In the afternoon the presidential address was delivered by Lawson Purdy, New York, the subject being "Municipal Pensions." Clinton Rogers Woodruff, Philadelphia, secretary, made his annual review on the subject, "American Cities During War Times and Their Problems." Committee reports were made by city manager Henry W. Waite, of Dayton, on "City Management as a Profession"; by Dr. Delos F. Wilcox on "Recent Developments in the Public Utilities Field," and on "State Municipal Leagues" by Homer Talbot, of the Kansas league.

In the evening a general session took up the problem "Feeding Our Cities in War Time." The speakers were George W. Perkins, chairman of the New York Market Commission, on "A State Organization for Food Supply"; Clarence S. Kates, "Agents for Better Local Distribution of Food"; Marcus M. Marks, borough president, Manhattan, New York, "Wholesale and Retail Markets," and Everett Colby, "How the Cities Can Effectively Assist in the Food Crisis."

On Thursday morning a joint session was held with the bureaus of municipal research under the chairmanship of Otto Kirchner, Detroit. The subject was "Executive or Legislative Budgets" and both sides were discussed by Governor Emerson C. Harrington, of Maryland, Dr. Frederick H. Cleveland and Dr. E. A. Fitzpatrick.

At a luncheon the members took up the possibilities of "Non-Partisan City Government." Prof. Charles E. Merriam, of Chicago, in a paper, asked whether it could be obtained and then a number discussed whether the non-partisan ballot eliminates the party machine in large cities.

A general session in the afternoon dealt with the problem of "The City and the County," Richard S. Childs being chairman. The situation in Baltimore and Denver were explained; George C. Sikes discussed "Consolidation Problems in California," and Prof. Wm. Anderson "Urban-Rural Consolidation in Europe."

"Training for Public Service" was the topic of a general session held Friday morning. Gaylord C. Cummin, city manager, Grand Rapids, discussed "Training City Managers"; "Getting Trained Men Into Public Service" was the theme of Dr. Wm. H. Allen, of the Institute for Public Service, New York; "Effects of War on Trained Public Service," Richard H. Dana, president, National Civil Service Reform League, and "Organized Labor and a Trained Public Service" were presented.

At the luncheon, "Selling Good Government to the People" formed the topic for an interesting discussion during which Dr. D. F. Garland, director of welfare, Dayton, talked on "Humanizing Welfare Reports."

"War Time Experiences of English and Canadian Cities" was discussed by Sir George Reid, Premier, New South Wales; Sir George Gibbons, and mayor Thomas L. Church, of Toronto, at a general session held in the afternoon.

City Managers' Association.

An interesting experience convention was held during the three days' sessions of the city managers at the Detroit meeting. The first day, Monday, was devoted to inspection trips and an informal dinner.

At the roll call on Tuesday morning each manager gave his length of service and business or profession before becoming manager. Of the 25 registered, 90 per cent were engineers. At the afternoon general session, H. G. Otis, of Beaufort, S. C., was chairman and Manley Osgood, Ann Arbor, Mich., described his city's experiences with paving. E. P. Goodrich, New York, had a paper read on "City Planning for Small Cities."

At a round table meeting held Wednesday morning valuable experience was shared by the managers on practical problems in administration relating to law; public utilities; officials and workmen; newspapers; commissioners; financing public improvements; special problems of small cities; governmental conditions.

An open meeting in the afternoon was presided over by city manager G. O. Nagle, of Wheeling, W. Va. Richard S. Childs asked in a paper "Now that we have the city manager plan, what are we going to do with it?" and the discussion of the question was led by city manager Henry M. Waite. W. P. Lovett of the Detroit Citizens' League spoke on "Our Citizen Bosses" and city manager H. L. Roby, of Alpena, Mich., led the discussion. A dinner in the evening was marked by an address by Prof. O. E. Merriam, of Chicago.

A business session was held Thursday morning. City manager Waite gave a splendid report on city management as a profession and divided cities into three classes, enumerating the general qualifications for manager needed in each class.

The following officers were elected for the coming year: President, Gaylord C. Cummin; vice-president, C. A. Bingham; secretary-treasurer, H. G. Otis, Beaufort, S. C.

Association of Governmental Research Agencies.

This association met Nov. 20, 21, 22 at the Detroit convention and a number of important problems involved in municipal research practice and citizen interest were covered by representatives of all the important research bureaus in the country.

"Bureau Relationships" was discussed in the phases of cooperation between bureaus, with other civic agencies and with officials by LeRoy Snyder, Rochester; Chas. A. Beard, New York; Horace L. Brittain, Toronto, and Frederick P. Gruenberg, Philadelphia.

At a dinner Tuesday evening, there was a round table discussion on "The Effects of Changing Bureau Personnel," from the viewpoint of directors, trustees and public officers, in which the following participated: D. C. Sowers, Akron; A. M. Mandel, Detroit; F. M. Harpham, Akron; H. M. Waite, Dayton; Gaylord C. Cummin, Grand Rapids; H. S. Keeler, Chicago, and Stanford T. Haynes, Springfield.

"Improvements in Budget Procedure" was the theme of the Wednesday morning session and the subjects taken up were: "Responsibility for the Financial Plan," "Appropriations for Activity," "Classifications of Estimates," "Control of Salaries" and "Budgeting of Bonds." The chairman was George Engle, comptroller of Detroit, and the discussion leaders were the following municipal researchers: Herbert Sands, New York; Lent D. Upson, Detroit; W. B. Holton, San Francisco; LeRoy E. Snyder, Rochester; Don C. Sowers,

Akron; R. E. Miles, Ohio Institute of Public Efficiency, and M. G. Lawton, Rochester.

At luncheon there was a round table discussion of municipal surveys with the following topics: "Do Surveys Produce Results?" "The Build-As-You-Go Survey," "Follow-Up of Surveys," "Surveys vs. Active Cooperation." Carl E. McCombs, J. H. Hutchinson, H. S. Morse, W. B. Holton, LeRoy Hodges and Bruce Cornwall led the discussion.

At the afternoon session "Improvements in Municipal Accounting Procedure" were taken up and cost accounting, central purchasing and stores

accounting and payroll accounting were investigated.

The final Wednesday session dealt with "The Relationship of Bureaus and Universities" and a number of prominent university educators and research bureau men took part in it.

The convention ended with an informal conference Thursday evening on the subjects of street cleaning, sewers, education and police.

American Road Builders' Association.

The fifteenth annual convention of this association will be held some time during the early part of February in St. Louis. Exact date and location of headquarters will be selected later.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

In constructing SEWERS, Des Peres, Wis., has the engineering services of the firm of Orbert & Albert.

A SEWER SYSTEM and DISPOSAL PLANT are to be built by West Middlesex, Pa. The engineer is Louis D. Tracy.

Armagh, Que., is constructing a WATER POWER PLANT. The engineers for the work are Couvin & Beauchemin.

STREET IMPROVEMENTS are to be made by Lindsborg, Kans., plans and specifications for the work being in course of preparation by the engineering firm of Riddle & Riddle.

Rochester, Minn., is to construct a BRIDGE to cost about \$40,000. The consulting engineer, J. H. A. Brahtz, has been selected to prepare plans and specifications.

Anderson, Ind., is to make extensive SEWER IMPROVEMENTS to cost about \$450,000. The city has retained G. L. Clausen to prepare plans and specifications for the work.

SEWERAGE and WATERWORKS SYSTEMS are to be built by Campbellsport, Wis., which has retained Jerry Donahue as consulting engineer to prepare plans.

A large RESERVOIR, to cost about \$200,000, is to be built by Vallejo, Cal. Plans and specifications for the improvement have been completed by the engineer, F. H. Tibbetts.

A FILTRATION PLANT and DAM are to be built by Cossackie, N. Y. The village has retained Morrell Vroomen as engineer to prepare plans and specifications.

The city of Seattle, Wash., is engaged in a case against the local lighting company before the state public service commission involving the GAS RATES. The city has retained as its expert to investigate and testify, Edward W. Bemis.

In making repairs to a BRIDGE, Johnstown, Pa., has the services of the Farris Engineering Company.

A SEWAGE DISPOSAL SYSTEM is to be built by Rutledge, Pa. The engineer is C. E. Collins.

A FILTRATION PLANT is to be built by the borough of Mt. Joy, Pa. Plans have been completed by the engineers, Gannett, Seelye & Fleming.

Kenilworth and Winnetka, Ill., are making PAVING IMPROVEMENTS. Plans for the work were prepared by the engineers, Windes & Marsh.

Pulaski county, Little Rock, Ark., is to build a reinforced concrete BRIDGE to cost about \$800,000. The county commissioners have retained Daniel B. Luten to design the structure.

Jersey City, N. J., is to build a SEWAGE DISPOSAL PLANT at Boonton. Plans for the improvement are being prepared by the engineer, Clyde Potts.

Minot, N. D., is to improve its WATERWORKS by extending its mains and building a 3,000,000 gallon concrete reservoir. The engineer is Frederick Bass.

Preliminary plans for PAVING IMPROVEMENTS in Cleveland, Okla., have been made by the Benham Engineering Company.

Detroit, Mich., is considering the construction of a RAPID TRANSIT SUBWAY to relieve increasing traffic congestion. The city officials are conferring on possibilities with the firm of Barclay Parsons & Knapp, which has been retained to investigate and report.

Okmulgee County, Okla., is to make extensive ROAD IMPROVEMENTS, including the grading and paving of about 118 miles and the construction of culverts. Plans and specifications for this work were prepared by the consulting engineering firm of Harrington, Howard & Ash.

PERSONALS

Tuska, Gustave R., consulting engineer, of New York City, formerly chief engineer of the Panama Railroad company, and lecturer in engineering at Columbia University, has been commissioned Major in the engineer section or the Officers' Reserve Corps of the United States Army.

Smith, William Burns, mayor of Philadelphia, Pa., from 1884 to 1887, died recently at his home in Laurel Springs, N. J.

Hommon, Charles C., formerly in charge of the Atlanta, Ga., sewage disposal plants, has recently received a commission as Captain in the Sanitary Engineers' Corps of the Army and is for the present stationed at Atlanta in connection with the operation of the sewage plants at the army camps located near the city.

Kastenhuber & Anderson, the firm of civil engineers and surveyors, Easton, Md., has closed its office for the period of the war, both members of the firm having entered army service. E. G. Kastenhuber, Jr., is first lieutenant in the Sanitary Corps and John Anderson is sergeant, Battery D, 310th Field Artillery.

Mayor-elect John Galvin, of Cincinnati, O., has announced the following appointments: John R. Holmes, director of public safety; Charles F. Hornberger, director of public service; Newbold L. Pierson, secretary to the mayor.

The following mayors were recently elected in Indiana:

Martinsville—George F. Schmidt.
Michigan City—F. C. Miller.
Mishawaka—Ralph W. Gaylor.
Mitchell—Calvin Farris.
Monticello—S. W. Thompson.
Montpelier—David Bryston.
Mt. Vernon—George F. Zimmerman.
Muncie—Rollin H. Bunch.
Newcastle—George A. Elliott.
New Albany—Robert W. Morris.
Noblesville—D. B. McCoun.
North Vernon—Albert A. Tripp.
Peru—Maurice Clifford.
Portland—C. O. Mitchell.
Plymouth—Charles F. Holtzendorff.
Princeton—E. E. Noble.
Rensselaer—Charles G. Spitler.
Richmond—Dr. W. W. Zimmerman.
Rising Sun—Scott Thompson.
Rochester—H. G. Miller.
Rockport—Edward Martin.
Rushville—Arthur B. Irvin.
Seymour—C. W. Burkhart.
Shelbyville—Lee B. Hoop.
South Bend—Dr. Franklin R. Carson.
Sullivan—Henry Smith.
Terre Haute—Charles R. Hunter.
Tipton—S. D. Rouls.
Union City—Charles J. Gunkel.
Valparaiso—P. L. Si-son.
Veedersburg—Orville V. Zimmerman.
Vincennes—James D. McDowell.
Wabash—Dr. L. W. Snith.
Warsaw—Charles A. Rigdon.
Washington—Dr. S. L. McPherson.
Winchester—George Leggett.
Whiting—W. E. Schrage.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices at all points remain the same after the recent rise. Quotations: Chicago, 4-inch, class B and heavier, \$58.50; 6-inch \$55.50. New York, 4-inch, class B and heavier, \$59.50; 6-inch, \$56.50. Birmingham, 4-inch, class B and heavier, \$53; 6-inch, \$50; class A, \$1 extra, all sizes.

The Federal Motor Truck Company, Detroit, Mich., has just let a contract for the construction of an addition to its plant capacity which will greatly increase the present floor space in order to keep pace with its steadily expanding business. The new building will be of brick and steel construction and will be rushed in order to be in use in time to meet the present heavy requirements. With the completion of this structure, Federal facilities will have increased about one hundred per cent during the past year. This added manufacturing capacity will, however, suffice to meet the immediate demands only. It will be necessary to further extend the present plant in order to care for the constantly growing business of the company. To this end plans for other new buildings are now in course of preparation. In its eight years of corporate existence, the company has experienced a steady, consistent growth. The company's capitalization has increased from \$50,000 to \$2,000,000.

The Goodyear Tire & Rubber Company, Akron, O., announces that the past year's business was the most successful in volume and profits, of any year in the company's history. Gross sales jumped from \$63,000,000 to \$111,000,000 and net profits from \$7,003,330.09 to \$14,044,206.10—an increase of 74 per cent in volume and 100 per cent in profits. And of this volume less than one per cent was contributed by direct war business. President F. A. Seiberling, in his report to stockholders, stated that plant extensions under constructions a year ago had been completed, nearly doubling its productive capacity, and providing facilities for several years to come. "To provide for these extensions," he said, "the directors during the year increased the fixed capital of the company by the sale of \$7,500,000 preferred stock and \$3,372,000 common stock. The company's good will, growing out of satisfactory trade relations with over 70,000 customers and more than a million users of its product, is steadily increasing in value and constitutes its most valuable asset, though not listed in our balance sheet. And the patents, trade-marks, designs, etc., although worth millions of dollars to us, are listed on our statement at but \$1.00. We have earned the past year, subject to deductions for federal tax, 61½ per cent for the common stock of this company—the highest record we have ever made." All of the directors were reelected, as fol-

lows: F. A. Seiberling, C. W. Seiberling, G. M. Stadelman, F. H. Adams, P. W. Litchfield, H. B. Manton and J. B. Loomis. The directors in turn elected the following officers: F. A. Seiberling, president and general manager; C. W. Seiberling, vice president and manager of purchases; G. M. Stadelman, vice president and manager of sales; P. W. Litchfield, vice president and factory manager; A. F. Osterloh, secretary; W. E. Palmer, treasurer and assistant secretary; H. J. Blackburn, second assistant treasurer.

MUNICIPAL INDEX

(Continued from page 593)

Town Planning After the War in Dundee, Scotland. Laying out the districts; type, design and cost of houses. 4 ills. 3,000 words. American City, November, 50 cts.

A Billboard Ordinance of Unusual Significance. By Seward C. Simons, Secretary, Los Angeles Municipal League. 2 ills. 2,000 words. American City, November, 50 cts.

Some Aspects of the Housing Problem. By J. Holroyde. 3,000 words. The Surveyor, October 19. 40 cts.

Construction of Industrial Villages for Workmen. Description of two recent projects carried out by Goodyear Cotton Mills Co. and the Youngstown Sheet & Tube Co. 1 ill. 2,200 words. Engineering & Contracting, November 28. 10 cts.

BRIDGES AND DAMS.

Pennsylvania Specifications for Culverts and Short Span Concrete Bridges. 1,200 words. Municipal Engineering, November, 25 cts.

Twenty-Four Designs for Salem Bridge Wasted Before Commissioners Agreed. 5 ills. 2,200 words. Engineering News-Record, November 8. 15 cts.

General Specifications for Steel Highway Bridges, Ontario, 1917. An analysis of the 1917 specifications shows many changes and improvements. Recommended length of beam span has been extended from 35 to 40 feet. By E. H. Darling. 3 ills. 2,600 words. Canadian Engineer, November 8. 15 cts.

The Greatest Arch Bridge in the World and Its Cost. Figures concerning the Hell Gate arch. 1,200 words. Engineering & Contracting, November 28. 10 cts.

Design of Piedmont Park Bridge, Atlanta. Architectural treatment of structure spanning railway tracks in attractive residential section. By Albert M. Wolf. 7 ills. 2,500 words. Concrete, November, 20 cts.

Permanent Versus Temporary Bridges. By Daniel B. Luten. 1 ill. 1,500 words. Cement & Engineering News, November, 20 cts.

Rainbow Arch Bridges. Two Illinois structures are exceeding artistic in appearance. This design is very economical where head room is not sufficient for the ordinary type of dirt-filled arch. 4 ills. 1,100 words. Cement Era, November, 20 cts.

French Engineers Span Alsne River Under Shell Fire. Small steel pontoons support the first foot bridge. Scows moored to carry heavy traffic bridge. Permanent steel structure finally completed. By Robt. A. Drake. 3 ills. 2,200 words. Engineering News-Record, November 29. 15 cts.

Separate Concreting of Ribs, Deck and Sidewalks Saves Form Lumber. Centers for 60-ft. span bridge take less than 7,000 ft. B. M. Concrete chutes erected by pulling them along cables. 6 ills. 1,000 words. The Contractor, November 23. 10 cts.

Special Forms Facilitate Concreting of Viaduct Deck Slab. 1 ill. 800 words. Engineering News-Record, November 29. 15 cts.

The Chouteau Avenue Viaduct. Inclined approaches along viaduct from bottom of valley spanned. Vehicle subway under one side of the floor. Provision for expansion. Delivering concrete from a central plant. By W. E. Hardenburg. 4 ills. 1,600 words. Municipal Journal, November 1. 10 cts.

Dam of Home-Made Design Failed in Nova Scotia. Unable to pass flood waters,

dam failed from wash-out at end. By K. H. Smith. 4 ills. 1,000 words. Canadian Engineer, November 22. 15 cts.

STRUCTURES AND MATERIALS.

Field Tests Made on Oil Treatment of Wood Against Marine Borers. By C. H. Teesdale, and L. F. Shackell. 6 ills. 3,500 words. Engineering News-Record, November 15. 15 cts.

Diagram for Use in Designing Timber Columns. By W. S. Wolfe. 1 ill. 1,200 words. Engineering & Contracting, November 28. 10 cts.

Density Factor Safe Guide to Strength of Structural Timber. Result of investigations made recently. 1,100 words. Engineering & Contracting, November 28. 10 cts.

Tests on Nailed Joints in Fir and Hemlock Timbers. Building Bureau of Portland, Ore., establishes safe loads for woods commonly used on Pacific Coast. 3 ills. 1,200 words. Engineering News-Record, November 8. 15 cts.

Concrete Pipe Under Hydrostatic Pressure. Discussion by the Editor. 1 ill. 2,000 words. Concrete, November, 20 cts.

Making Concrete Pipe Specials. Methods of making Y's, T's, bends and other fittings. 2 ills. 2,500 words. Concrete, November, 20 cts.

Method of Waterproofing Concrete Sewers. Competent inspection and proper materials necessary. By Duncan Cameron. 700 words. Cement Era, November, 20 cts.

Simple Precautions Make Cold Weather Concreting Safe. 1,000 words. The Contractor, November 9. 10 cts.

Practical Methods of Handling and Measuring Bulk Cement. 1,100 words. Concrete, November, 20 cts.

Cement Saved by Using Screened and Remixed Gravel Instead of Pit Run Gravel. By J. P. Nash. 2 ills. 1,000 words. Engineering & Contracting, November 7. 10 cts.

MISCELLANEOUS.

Improving Municipal Reports. Suggestions by officials of Columbus, O. Prompt completion, condensation and uniformity in rendering make reports valuable. 1,500 words. Municipal Journal, November 22. 10 cts.

The "Cost Plus" Form of Contract Used on Cantonment Work, Including a Schedule of Equipment Rental Rates. 6,000 words. Engineering & Contracting, November 28. 10 cts.

"Cost Plus" Contract Forms of Stone & Webster. 1,800 words. Engineering & Contracting, November 28. 10 cts.

Lump Sum Versus "Cost Plus" Contracts. From a paper by F. A. Jones. 2,500 words. Engineering & Contracting, November 28. 10 cts.

The Housing and Feeding of Construction Forces. Dining room and kitchen. Kitchen utensils, dishes and other equipment needed. Laying out of buildings, forms for reports, water supply, garbage, lighting and care-taking. 5 ills. 6,000 words. Engineering & Contracting, November 21. 10 cts.

Lining an Irrigation Canal by Gunite Method. 6 ills. 900 words. Canadian Engineer, November 8. 15 cts.

Regulations of the State of Washington Regarding Construction Camps. 1,100 words. Engineering & Contracting, November 21. 10 cts.

Methods and Costs of Tree Planting. Abstract of bulletin of U. S. Dept. of Agriculture. 3,000 words. Engineering & Contracting, November 21. 10 cts.

Detention Reservoir With Spillway Outlets as an Agency in Flood Control. Abstract of paper before A. S. C. E. By H. M. Chittenden. 1 ill. 2,200 words. Canadian Engineer, November 1. 15 cts.

Calculations for Design of Irrigation Structures. From an article by C. W. Helmick. 3 ills. 1,000 words. Canadian Engineer, November 15. 15 cts.

One Solution of the Fuel Problem. Lessons from the work of the emergency purchasing committee of Kalamazoo in supplying winter fuel to citizens at reasonable rates. By J. E. Balch, Mayor. 3,000 words. American City, November, 50 cts.

Public Utility Rates. An article that should be read by every municipal officer, central station manager and public utility commission member. By H. S. Cooper. 7,000 words. General Electric Review, November, 20 cts.

Novel Gas Highway Beacons. Are installed at dangerous curves to warn motorists of danger. 2 ills. 1,000 words. Better Roads & Streets, November. 15 cts.

